

AUTOMOTIVE INDUSTRIES

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A New "Low" in Noise Level

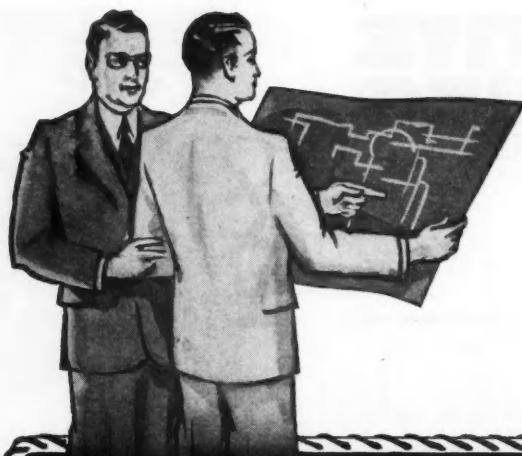
In spite of the increasing refinement in motor design, the public has become more and more critical as to the "noise level" which it considers acceptable.

For this reason, General Electric engineers have developed a new "cotton-center" Textolite timing gear, so that the noise made by the timing drive is submerged below the "noise level" of even the quietest motor. General Electric Company, Plastics Department, West Lynn, Mass.



942-9

GENERAL ELECTRIC



$$1+1=2$$

SIMPLE ARITHMETIC *Yet Vital to Spring Performance*

IN THE development of new equipment—efficient spring performance is not alone a matter of perfectly designed machines—or perfectly designed springs. Instead—it is a combination of both factors—of cooperation between the maker of springs and the manufacturer using them—that assures unfailing performance. In other words— $1+1=2$ —the most valuable of all formulae when special or unusual installations are called for. If you are planning a new device—or if present spring applications are proving troublesome—we suggest that you get in touch with us. Interesting and detailed information is available.



1831



1934

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
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SUBSIDIARY OF UNITED STATES STEEL CORPORATION
AND ALL PRINCIPAL CITIES

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

Empire State Building, New York
First National Bank Building, Baltimore
Export Distributors: United States Steel Products Company, New York

October 27, 1934

Automotive Industries

Low-Price Front Drives in '35?

Clean-Up Price Cuts

Clean-up price reductions are reported to have been authorized on Nash-LaFayette and Cadillac-LaSalle cars. As this is written, Ford, Chevrolet, and the 1935 Packard and Auburn models about make up the list of cars which are currently being sold at full list price.

ATA Votes for Self Regulation by Code

Vote Cooperation on Development of Sound Transportation Policy

CHICAGO, Oct. 24—The first annual convention of the American Trucking Associations, Inc., attended by delegates from 42 states representing all types of carriers, went on record here favoring self regulation under the trucking industry code.

The question of federal regulation of interstate operations, which had been expected to precipitate a bitter debate was thoroughly discussed, but definite commitment was side-stepped in the following resolution:

"It shall be the policy of the American Trucking Associations to cooperate with the Federal Coordinator of Transportation and with the Administration in the development of an economically sound national transportation policy, at the same time preserving and continuing for the industry the benefit of self-regulation under the code of fair competition for the trucking industry and, further, to preserve for the public, the economies and flexibility of motor transportation."

In debate Federal regulation had the support of a group of operators from the Pacific Northwest, but the opposition to definite commitment was overwhelming. This in the face of a resolution passed at a group meeting of about 150 common carrier operators urging the A. T. A. to favor "fair Federal regulation for common and contract interstate carriers only." This resolution received only three dissenting votes.

The contention also memorialized the

Report Two Makers Interested; Industry Focuses on New Models

By A. F. Denham

Detroit Editor, Automotive Industries

With shutdown period for model changes imminent, speculation is rife in the industry as to what new features next year's cars will bring forth.

At the present time, it appears almost certain that the larger car manufacturers will not go in for radical changes mechanically at this time, but that in some cases considerable change will be made in body lines, particularly in hood and fender design. Consequently, it is anticipated that whatever radical changes are revealed will appear on the new models of the independent manufacturers.

Among the latter group, the most important development is the present probability that two manufacturers will introduce front wheel drive cars aimed at the low-priced market. No doubt some of the producers would like to enter the rear engine field but find that the cost of the change-over is prohibitive in the face of inadequate cash resources. This situation has directed attention toward the light front drive which, as is the case with rear-engined cars, offers certain possibilities of savings in production costs due to the concentration of power and driving units, and the simplification of body and frame structure.

President and Congress to pass legislation at the next session repealing the one cent Federal tax on gasoline.

Yesterday the electoral college chosen under the code met and elected 12 permanent members of the national code authority.

Today the A. T. A. delegates elected officers for the next year. Ted Rodgers of Pennsylvania, was reelected president, and John W. Blood of Kansas, first vice-president.

Registrations at the three-day convention were over the 400 mark. Total attendance was in the neighborhood of 1000.

September Employment Wages Below August

Employment in the automobile industry in the state of Michigan during September totaled 213,738 compared with 234,137 for August and 185,157 during September, 1933.

Aggregate weekly payrolls were \$4,934,009 in September against \$5,475,121 in August and \$4,080,874 in September last year.

Average weekly earnings per capita were \$23.13 in September, \$23.38 in August and \$22.04 in August, 1933.

Other expected developments are the lower-priced cars by Packard and Lincoln, the former reported to be an eight and the latter a V-12. Several independents are planning to enter the lower-priced fields with new automobiles to build volume.

Meanwhile as the industry focuses its attention on new model production, the clean-up of this year's production under the impetus of widespread price reductions is proceeding at a fairly satisfactory pace. Although September sales declined seasonally from August by 21 per cent and were 3 per cent under September, 1933, when compared with production, it is evident that there was

a substantial reduction in field inventories last month.

New passenger car registrations during last month amounted to 153,000 as compared with 157,796 a year ago and 193,828 during August of this year. These are estimated figures based on returns received up to the time of going to press.

New truck registrations, based on the returns from these same 40 states, show 39,000 against 31,269 during September of last year, an increase of about 24 per cent.

On the basis of these estimates the combined total of new motor vehicle registrations amounted to 192,000 units which correspond with 189,245 for September of last year, an indicated increase of nearly two per cent.

Labor Demands Shorter Hours and Higher Wages in Automobile Code

WASHINGTON, Oct. 25—The American Federation of Labor has asked for reopening of the automobile code which expires midnight November 3 and will demand a reduction of hours to 30 a week as well as increased wage rates. This statement was made today by William Green, Federation president.

Mr. Green declared that the present 35-hour average week basis provided in the automobile code through exceptions brings the average work week to 42 hours. Going further, he said he will insist that the minimum rate of pay pro-

vided in the automobile code be raised and that rates of pay above the minimum class also be increased.

The fight against the merit clause also will be renewed, he stated. Organized labor will demand that the clause be eliminated. Referring to it as "a thorn in the side of labor," he pointed out that the clause provides advancement of employees on the basis of merit and declared that organized labor interprets it to mean recognition of company unions.

Furthermore, Mr. Green said, organized labor will demand recognition of labor on code authorities and that when the Recovery Act comes before Congress for continuance he will ask for more adequate labor representation on the National Industrial Recovery Board. He expressed the view that the problem of unemployment in the automobile industry had not been met by the code. Objection also was raised by Green to the seasonal dips in the industry. He declared that during peak production additional employees from surrounding communities are engaged and when dips set in they are thrown out to shift for themselves.

Taking a cue apparently from a suggestion by President Roosevelt in his last broadcast, Mr. Green said that more recognition should be given to the idea of figuring pay on an annual basis instead of on a daily or weekly basis.

At the next session of Congress, he stated, the Federation will ask that the collective bargaining section of the Recovery Act be strengthened.

Green expressed "grave regret" over the decision yesterday by Judge Wheatley of the Supreme Court of the District of Columbia holding the Railroad Retirement Act to be unconstitutional. He declared that if the higher courts sustain the decision he is confident Congress will revise the act.

Jan.-Sept. 2,500,000 Output Total 500,000 Over Entire '33 Production

September production of 174,451 cars and trucks in the United States and Canada brought output in the first nine months of 1934 practically to the 2,500,000 mark—the exact total being 2,493,277 according to the Census Bureau. This total compares with the full year's production in 1933 of 1,986,208 and with 1,700,815 in the first three quarters of last year.

Present indications make it certain that the October output will place production in the first 10 months well past 2,600,000. With new models going into production in large numbers in November and December, it now appears virtually sure that the year's output will

reach 2,900,000, if it does not exceed that figure.

Passenger car production in September amounted to 174,451, a decline of 29 per cent from August and of 12 per cent from September a year ago. However, the nine-month total of car production was 2,019,008, an increase of 42 per cent over the same period in 1933.

Truck production in the first nine months was 71 per cent ahead of last year with September exceeding the same month in 1933 by 29 per cent, but showing a loss from August, 1934, of 14 per cent.

Detail figures are given in the accompanying table.

Nine Months Production—U. S. & Canada

	Cars	Trucks	Total
Sept., 1934.....	128,120	46,331	174,451
Aug., 1934.....	190,825	53,888	244,713
Sept., 1933.....	161,734	35,874	197,608
9 Mos., 1934.....	2,019,008	474,269	2,493,277
9 Mos., 1933.....	1,422,946	277,869	1,700,815
	Per Cent Change		
Sept., '34 over '33.....	—20.7%	29.1%	—11.6%
9 Mos., '34 over '33.....	42.0	70.8	46.4

NRA Approves APEM Code Authority



From left to right they are Claire Barnes, Houdaille-Hershey; C. S. Davis, Borg-Warner, W. M. Albaugh, Thompson Products; W. K. Norris, McQuay-Norris; C. E. Wilson, GM; Vincent Bendix, Bendix Aviation, and M. C. Dewitt, Champion Spark Plug. Paul R. Beardsley, Sealed Power, also is a member of the Code Authority

Executives Back Dealer Code

Colors Distinguish Ford Parts Groups

Cartons containing Ford parts and accessories now vary in color combination according to the classified group to which the part or accessory they hold belongs. For example, accessories are packed in orange and brown cartons, the leather and rubber group in buff and red-brown containers, the nickel group in gray and red, etc.

Employment and Payrolls Are Lower in Auto Plants

Automotive employment in September was 81 per cent of the 1923-1925 average according to the Federal Reserve Board. This compares with 92 per cent in August and 72 per cent in September last year. The September payroll index was 54 against 76 in August and 53 a year ago. The index of production declined from 61 in August to 51 in September and from 55 in September last year.

NRA Approves "Liquidated Damages" Amendment

The "liquidated damages" amendment to the motor vehicle retailing code, proposed by the National Control Committee, has been approved by the National Industrial Recovery Board.

New Reo Commercial Units

A new 1½-ton commercial unit of high performance characteristics and a refined and improved 1½-ton chassis are announced by the Reo Motor Car Co. The former lists at \$495 and the latter at \$595 for the chassis.

Chrysler, GM, Hupp, Graham Signify Their Moral Support

by Don Blanchard

Editor, *Automotive Industries*

Dealer pressure on the car makers for statements of their attitude on the motor vehicle retailing code, is beginning to bear fruit. But whether the fruit will prove as palatable as dealers hoped remains to be seen.

Recently letters from headquarters executives discussing factory support for the dealer code have been received by field sales organizations of the General Motors car divisions and of the various Chrysler units. While the text of these letters has not been released, it is understood from other sources that they indicated that the code has the moral support of these factories.

So far as can be learned, the Ford Motor Co. has not sent any letter on the subject, but a sales executive of that company told *Automotive Industries* that Ford has the highest respect for the code and not only gives it moral support, but urges its dealers whenever the question comes up, to comply with its provisions. Similar opinions were expressed to *Automotive Industries* by C. W. Matheson, vice-president in charge of distribution for Graham-Paige, and by Rufus Cole, Hupp general manager.

Unofficially it is learned that the letter received by the GM field staff came from Mr. Sloan and was an expression of his personal views. He is reported to have said that while the used car rules may limit production temporarily, in the long run, if the code works, the effect will be beneficial. Meanwhile, he is reported to have indicated that the field force should support compliance with the code to give it a fair chance to prove what it can accomplish.

Scant information regarding the Chrysler letter has leaked out, but it is understood to have said that the code has the moral support of the corporation.

Of course, what the dealers have been driving for is factory cooperation in the enforcement of the code through the use, if necessary, of the cancellation weapon. However, so far as *Automotive Industries* has been able to learn, there is no indication that any such policy is contemplated by the factories at the present time. The attitude of the manufacturers apparently is that the dealers wrote the code and it is up to them to enforce it by complying with the rules. However, there is no doubt that statements by the factories that they regard the code favorably and are desirous that their dealers observe its rules, will have a stimulating effect on compliance.

In expressing his personal views, Mr. Matheson of Graham-Paige said he favored strict adherence by dealers to their code. "I feel that the code has been helpful even to those dealers who don't think it has," he said. "Of course, there always have been and always will be cheaters. The code minimizes cheating, however. There has been less of it and will be less of it, particularly since the courts have upheld the code and there is good indication of its enforceability. I believe in the long run it will be decidedly helpful to them."

Mr. Matheson's viewpoint is particularly interesting in view of the fact that a questionnaire sent to dealers and distributors sometime ago on the subject indicated that irrespective of adherence or non-adherence to the code, two-thirds of the organization were opposed to the present code either in its entirety or in particular details.

Rufus Cole, Hupp general manager, stated that, while his company had not circulated its position in writing, his policy was at all times, to give the code his company's moral support in any discussion with dealers on the subject, encouraging them to live up to its provisions.

APEM Divisional Administrators



From left to right: Harry L. Horning, Waukesha Motors, internal combustion engines; W. G. Hancock, McCord Radiator, replacement parts; C. C. Carlton, Motor Wheel, original equipment. J. Y. Scott, Van Norman Machine Tool, the fourth member of the group, administers the shop equipment division.

Andrews Sails Refusing Comment on Reports of Hupp-Citroen Deal

Refusing to comment on reports of a projected cooperative arrangement with Citroen, Archie M. Andrews, newly elected Hupp board chairman, sailed for Europe on Friday of last week. The reports which Mr. Andrews refused to affirm or deny were to the effect that some sort of deal was contemplated under which Hupp would build a low-priced front-drive patterned after the job which Citroen introduced recently in

C. M. Sorenson and R. P. Lyons of Detroit. Mr. Andrews is chairman of the executive committee which includes in addition Mr. Cole and Mr. Sorenson.

A company announcement says that the directors discussed in detail an expanded plan of activity for Hupp. Announcement on 1935 products will be made early in November and officials stated that a wider price range than ever before will be covered.

A. J. Brandt continues as assistant general manager in charge of engineering, purchasing and manufacturing.



Rufus S. Cole,
elected Hupp Gen. Mgr.

France. Under the plan, it is said that Citroen would ship finished body stampings temporarily to expedite production in this country while duplicate dies were being completed.

At the meeting of the Hupp directorate which followed the recent stockholders' meeting, Rufus S. Cole was named executive vice-president and general manager. Mr. Cole was formerly vice-president in charge of sales and assistant general manager.

Charles D. Hastings, a Hupp pioneer, has resigned as chairman of the board and also as president of the company. He assumed the latter office as well as the general managership last year when DuBois Young retired from the office.

Other officers elected include J. Walter Drake, vice-president; A. W. Bangham, asst. treasurer, and George E. Roehm, asst. secretary. The offices of president and of treasurer were not filled.

Three new directors were elected to the Board. They are Frank S. Lewis, Toledo attorney, who acted for the employees' association in last spring's Auto-Lite strike and who is counsel for the New York Central in Toledo, George Frischkorn, Detroit realtor, and Fred Cardway, formerly Packard export manager. Directors whose terms were carried over were Rufus S. Cole, A. M. Andrews, P. M. Hesli of Minneapolis, and

Graham Recommends Brazilian Duty Cut

"Mutual interest calls for the reduction of Brazilian automotive duties," Robert C. Graham, chairman of the export committee of the Automobile Manufacturers Association, told the Reciprocity Information Committee at a hearing on the proposed trade agreement with Brazil, held in Washington on Monday of this week.

"The lowest priced American cars are assessed by Brazil at an equivalent ad valorem duty of about 52 per cent," Mr. Graham said, "while Brazil's most important export to the United States enters free of duty. Therefore, to insure equal treatment from those to whom we accord equal treatment, we recommend that the present automotive duty rates be reduced to the level now prevailing in the other coffee countries."

AMA Discusses Deane's "Mutual Security" Plan

The problem of providing security from unemployment distress and the various plans which have been suggested as possible solutions were considered at a meeting of representatives of automobile manufacturing companies this week. The meeting, which was sponsored by the Automobile Manufacturers Association, was held in the General Motors Building, Detroit.

A. L. Deane, Deputy Administrator of the Federal Housing Administration and president of the General Motors Holding Corporation, made a presentation of the "mutual security" plan, of which he is the author.

The meeting was limited to a discussion of the plan and no action was taken by those attending.

Available for reference at the meeting was a report on unemployment insurance here and abroad compiled under the supervision of Stephen Bryce of the AMA.

Lubricant Cartridges Used in New Grease Gun

Greases packed in cartridges and a new type of "gun" to "shoot" them are now being marketed by Standard Oil Company (Indiana) throughout its territory.

To fill the new type of gun the operator merely slips in a factory-loaded cartridge of the desired lubricant. After using the required amount from any cartridge he can remove it from the gun and substitute another. Each cartridge can be used again later, and repeatedly until it is empty. In this way a single gun serves for a full greasing operation involving use of the several different lubricants which are required for proper lubrication.

The new equipment was developed by Lubrication Corp., a concern owned jointly by Standard of Indiana and Bendix Aviation.

Mack Truck to Sell and Service Reos in 11 Cities

Announcement has been made by C. A. Triphagen, Reo sales manager, of completion of arrangements with Mack International Truck under which Mack will sell and service Reo Speedwagons and commercial cars in the following cities: Brooklyn, Louisville, Tulsa, Omaha, New Orleans, Memphis, Akron, Erie, Baltimore, Chattanooga and Seattle.

The arrangement will not affect Reo dealers in these communities except insofar as Mack dealers will be selling Reo trucks in competition. Mack dealers will not handle Reo passenger cars, the statement says.



A. M. Andrews,
new Hupp Board chairman



W. M. Packer—
(Left) Newly ap-
pointed sales man-
ager for the new
low-priced car to
be built by Packard
L. W. Slack—

L. W. Slack—
(Right) who has
joined Packard as
sales promotion
manager of the
new low-priced car
division



W-O-Hupp Deal Denial Said to Be Premature

Distributors Queried on
Question of Completing
Negotiations for Cars

Reports in some trade publications last week that negotiations had been broken off between Hupp Motor Car Corp. and Willys-Overland with regard to merchandising by Hupmobile of Willys cars, were slightly premature as indicated by a letter sent to its distributors by Hupmobile this week. The distributors are asked whether they would still like to go through with the deal in view of the fact that under the present arrangements made by Willys-Overland receivers, Hupmobile would not have exclusive distribution with revamped cars. It seems a foregone conclusion, however, that the answer from the dealer organization will be negative.

The hitch in this situation, it is reported, came about as follows: In addition to the tentative Hupmobile deal, a group of four individuals prominent in the automotive retailing field and specializing in clean-up sales of large stocks of cars, made arrangements with Willys to take over part of the contemplated production. Hupp apparently was willing to go through with the deal, even under these considerations, providing they would have exclusive distribution of these cars with a new front end and other modernizing modifications.

Since then, it is alleged, the second group also insisted on the new front ends for their share of the production, and Hupmobile was unwilling to accept the remainder of the cars for sale in competition with others.

Thorne Joins Olds

Maurice Thorne, recently chief experimental engineer of the Pierce Arrow Motor Car Company, has joined the engineering staff Olds Motor Works in the capacity of project engineer, a newly created position. Mr. Thorne at one time was manager of the Research Department of Automotive Industries, and later experimental engineer with the Studebaker Corp. in South Bend.

Motor Code Renewal Comes Up Next Week

Car Manufacturers Discuss
Extension in N. Y. Meeting

There is considerable confidence in the industry that the automobile manufacturing code which expires November 3 will be renewed without major change. Although there is some feeling that NRA will hold a public hearing on the extension, the time remaining before the code expires makes this appear somewhat doubtful.

No proposals have been received from the manufacturers, it was indicated in Washington this week. However, it is understood that the NRA Labor Advisory Board has been making some studies on the code and has reported its results to administration officials. The nature of these studies has not been revealed.

Renewal of the code was discussed at a meeting of the Automobile Manufacturers Association held in New York this week, but it is understood that no definite action was taken.

Labor is expected to press as usual for the elimination of the merit clause and shorter hours. On the former of these issues, the manufacturers will not compromise and there is considerable doubt that they will on the latter. Labor costs already are so high that even those manufacturers who are in the black find their profits unsatisfactory, and last spring's unfortunate effort to raise prices indicates clearly that further increases in cost at this time cannot be passed on to the public.

Lenz Receives Whitting Medal From Foundrymen

For noteworthy contributions to the foundry industry during the past year Arnold G. Lenz, assistant general manufacturing manager in charge of the

Chevrolet plants at Flint, Saginaw and Bay City, was awarded the J. H. Whitting gold medal this week.

The award was made in Philadelphia at the annual convention of the American Foundrymen's Association. Each year the association gives the Whitting medal to that man whom it considers has done the most to advance the industry.

Justice Dept. Studying Added Houde Evidence

Announcement was made today that the Department of Justice is studying so-called additional evidence in the case of the Houde Engineering Corporation, Buffalo, to determine whether or not the department will proceed against the company in an effort to get a court order compelling recognition of the United Automobile Workers as the exclusive agency for collective bargaining.

The department has withheld action against the company on the grounds that evidence produced at hearings before the National Labor Relations Board was insufficient to justify prosecution. Meanwhile, the automobile union declared it would supply the necessary evidence. With a view to doing so seven affidavits were filed Tuesday with the department by Charlton Ogburn, union counsel. The affidavits were signed by members of the union who claimed that on Oct. 9 the company refused to recognize the union as representatives of all employees.

Nine Months Earning Statements

Car Companies	1934	1933
Graham-Paige	+ \$21,852	+ \$145,934
Yellow Truck & Coach	— 238,582	— 1,148,069
Total—2 companies	— \$216,730	— \$1,002,135
Other Automotive Companies		
Bohn Aluminum	+ \$1,263,456	+ \$1,159,229
Gabriel Co.	— 29,295	— 2,812
Eaton Co.	+ 866,969	+ 292,895
Libbey-Owens-Ford	+ 2,819,068	+ 3,684,018
Total—4 companies	+ \$4,920,198	+ \$5,133,330

Eastman Hits Truck Makers Again in ATA Speech on Regulatory Legislation

Continuing what is beginning to look to some like a campaign to drive a wedge between truck makers and their customers who heretofore have usually fought shoulder to shoulder against adverse legislation, Federal Coordinator of Transportation Eastman fired another salvo at the manufacturers in his address this week at the first national convention of the American Trucking Associations, Inc., in Chicago.

After outlining his now familiar thesis that public regulation of all transportation agencies is in the public interest, Mr. Eastman asserted: "There may be those who dispute these propositions. . . . They will not be disputed by experienced and responsible operators, of railroads, and I do not believe that they will be disputed by experienced and responsible operators of the trucks. They may be disputed by some of the truck manufacturers, second-hand dealers and brokers; but they have special axes to grind and are not the men who bear the heat and burden of the day in truck transportation."

Giving full credit to motor transportation for furnishing a service which the country wants, Mr. Eastman said that "this service ought not to be stifled, and that as a matter of fact it is impossible to stifle it. On the contrary it will continue to grow." However, common transportation for hire, he declared, has always been regarded as a public business and it has been recognized as a proper subject for public regulation.

Defending his well-known views that all transportation agencies should be put under the Interstate Commerce Commission in the interest of coordination, Mr. Eastman indicated that the "railroadness" of the Commission as constituted at present when it is concerned only with the railroads, would certainly be changed if it were given jurisdiction over motor and water carriers. Apparently as a trial balloon he gave one illustration of how this might be done. He suggested enlargement of the Commission appointing certain new members; special divisions to specialize on each important form of transportation; a chairman for the entire Commission; a control board consisting of the chairmen of the Commission and of each of the special divisions, this control board to determine general policies. He also said that any regulatory statute must be so framed as to provide for the peculiar problems of milk, periodical, livestock, films, etc., haulers.

To refute contentions that rail rates would become the standard for motor carrier tariffs, the Coordinator said that it may be convenient in many instances to relate motor rates to rail charges and that truck operators have often done so of their own volition. "But when any fundamental question arises as to the bottom level of the rates, there can be no escape from the conclusion that the fair cost of motor transportation is of paramount importance. . . . any other course will most certainly defeat itself, owing to the opportunity which many shippers have to operate their own private trucks. . . . If you want the

cost principle recognized in the law, it may be that it can be done. . . ."

Federal regulation of sizes and weights also is seen as a possibility by Mr. Eastman. On this point he said in part: ". . . plainly the reasonable use of the public highways in interstate commerce, and particularly of those which have been built with Federal aid, is a matter which cannot ultimately be left to the decision of the States, if any insist upon the prescription of unwise and unreasonable regulations which tend to obstruct the free flow of interstate commerce."

As to whether trucks are bearing their proper share of highway costs, Mr. Eastman said that his staff was studying this subject and that tentative drafts of its conclusions are being sent out to representatives of the railroads and of the motor transport industry for their comment.



Frank J. Denny

Whose appointment as advertising manager for Cadillac has been announced by J. C. Chick, general sales manager

Al Reeves Prognosticates Detroit Future in Speech

"Detroit will become the home of such new industries as those making pre-fabricated houses, air-conditioning units and streamlined, light-weight railroad trains," Alfred Reeves, AMA vice-president, predicted in a speech before the Detroit Rotary Club this week. "It seems reasonable to expect," he continued, "that business in Michigan will make greater strides during the next few years than probably in any other section of the United States."

Turning to national affairs, Mr. Reeves said: "Washington mirrors the conditions throughout the country as well as the needs and desires of organized interests of various kinds. Notwithstanding, it is remarkable how sensi-

tive our capital is to the wishes of its citizens, provided they are presented in a constructive way. Individually and collectively business men must solidify their views, as labor and agriculture have done, and present them to the lawmakers who are entitled to the information for their own guidance."

Angell Denies Charges in Stockholders' Suit

Reports \$3,000,000 of Unfilled Orders on Books

Charges made in a suit instituted last week against Continental Motors and its officials have been denied emphatically by W. R. Angell, president of the corporation.

"The bill contains statements that are so ridiculous on their face," Mr. Angell said, "they do not deserve the dignity of a public answer further than to say we will take the first opportunity definitely and positively to disprove every statement made. This suit appears to be the outgrowth of an attempt made last summer by certain persons to gain control of the company's affairs."

"Within the last two weeks Continental has received orders aggregating more than \$2,000,000 of new business. At present it has on its books over \$3,000,000 of unfilled orders for machine products and parts including motors for use in governmental, automotive, aviation, marine and industrial application. The company's prospects are definitely on the upgrade and better than any time during the past four years."

While not mentioned in the statement, recent orders include aircraft type engines for army ordnance division, and spark ignition engines adapted to burning either kerosene or gasoline for a foreign government. The latter engines are of conventional design but have higher compression and more heat on the manifolds.

The suit was brought by four stockholders who are said to own 620 shares of stock and seeks restitution of about \$16,000,000 which it is alleged was dissipated in the last four years.

Milwaukee Engineers Name Dr. E. R. Stoekle President

Dr. Erwin R. Stoekle, chief engineer and vice-president of the Globe-Union Mfg. Co., Milwaukee, storage batteries, radio parts, etc., has been elected president of the Engineers Society of Milwaukee. Bruno V. E. Nordberg, executive engineer, Nordberg Mfg. Co., was named vice-president. Newly elected directors include R. C. Newhouse, chief engineer, Allis-Chalmers Mfg. Co., and Walter Ferris, vice-president Oilgear Co.

Cost of Packard's Expansion Plans Indicated by Nine Months' Net Loss

The cost of Packard's reorganization and expansion plans, coupled with the introduction of the new low-priced model which is expected toward the close of the year, will be fairly accurately indicated in the forthcoming nine months' statement which, according to company reports, is expected to show a net loss for the January-September period of about \$5,368,000 as compared with a net loss of \$487,084 for the same nine months of 1933.

Approximately \$6,200,000 is being spent by the company in reorganization, development of plant facilities and the new line of cars. Also some of this expenditure is represented in the Twelfth Series Packard cars introduced this fall and which embodied extensive changes. By the end of this year Packard estimates that \$3,500,000 will have been spent for tooling on both cars; \$1,200,000 for engineering; \$1,000,000 for machinery and equipment, and \$500,000 for plant rearrangement. This total compares with about \$1,100,000 spent for development and tooling last year.

Heavier promotional expenses and increased salary and payroll outlays are being occasioned through the necessity of building up sales and factory personnel for the new car. The company has added approximately 150 engineers to its staff, and the factory and sales organizations are now being rounded out.

Among recent additions are W. M. Packer, appointed sales manager of the new car division. Mr. Packer formerly was a regional manager for Chevrolet. George T. Christopher, formerly Buick factory manager, has been named assistant vice-president of manufacturing, and L. W. Slack has been made sales promotion manager of the small car division. Formerly Mr. Slack held a similar position with Pontiac.

The Packard company has made arrangements for charging against operations all costs which are not properly capital expenditures. Each quarter of the current year has been called upon to bear its share of the total costs. All told, this year's operations will be required to absorb about \$5,000,000 of the total expense in connection with the whole development program. These extraordinary charges will be reflected in the third quarter report, which at this time is expected to show a net loss of about \$2,400,000, comparing with a net loss of \$1,711,123 for the preceding quarter and a net profit of \$622,786 for the corresponding quarter of last year. The indicated net loss for the first nine months of this year has been reported in a previous paragraph.

Cash and marketable securities on September 30 amounted to \$13,000,000 compared with \$15,114,017 a year earlier. Further reduction in the cash account can be expected, the company states, during the current quarter since provision was made in advance for some extraordinary items already charged to operations for which

actual cash outlays will be made in the final quarter together with that period's share of the increased expense.

According to company reports, steady progress is being made in the manufacturing program laid out for the Twelfth Series cars introduced early last month. Deliveries of the five passenger sedans during the first month they were on the market exceeded deliveries of similar body types in the first month of last year by 30 per cent.

Los Angeles Appoints Templin as Engineer

E. W. Templin has been appointed junior engineer for the Los Angeles Department of Water and Power. He is serving with the General Plant Di-



E. W. Templin

vision which has control of operation and maintenance of a fleet of 1,300 cars and trucks, and also a large number of tractors, power shovels, etc.

Mr. Templin was formerly chief engineer of the Six-Wheel Co., Philadelphia, and subsequently was connected with manufacturing organizations in Detroit. He is a past-chairman of the Philadelphia Section and at one time was a member of the S.A.E. Council.

Dr. von Schrenk Succeeds W.H. Bassett as ASTM Head

Dr. Hermann von Schrenk, Consulting Timber Engineer, St. Louis, Mo., and senior vice-president of the American Society for Testing Materials has been elected president of the society. This action was taken by the executive committee to fill the vacancy caused by the death of W. H. Bassett, soon after he took office as head of the Society.

The vacancy created by Doctor von Schrenk's election was filled by the appointment of H. S. Vassar, as senior vice-president, Mr. Vassar having been elected a vice-president last June.

A. C. Fieldner, Chief Engineer, Experiment Stations Division, U. S. Bureau of Mines, Washington, D. C., has been elected junior vice-president. No action was taken to fill the unexpired term of Mr. Fieldner as a member of the executive committee.

Stettinius Rejoins NRA

While no formal announcement has been made either by President Roosevelt or the NRA it is understood that Edward R. Stettinius, Jr., has been recalled to Washington by the National Industrial Recovery Board in an advisory capacity. Last December Mr. Stettinius resigned as liaison officer of the Industrial Recovery Board to accept the vice-chairmanship of the United States Steel Corp. finance committee. Prior to his association with the Steel Corp. Mr. Stettinius was a vice-president of General Motors.

Lewis A. Pease

Lewis A. Pease, of the engineering staff of the A. O. Smith Corp., Milwaukee, died last week. He was 50 years old. Mr. Pease was a graduate of the University of Illinois engineering school. During the world war he served as a Lieutenant Commander in the United States Navy in charge of maintenance of property at the Naval Training Station, at Great Lakes, Ill. Mr. Pease then joined the main works of Fairbanks, Morse & Co., at Beloit, Wis., and at the time of his resignation in August, 1933, to join the Smith organization, he was special consulting engineer on Fairbanks-Morse Diesel power plants.

Auburn Salesmen's Club

As one of the major features of its sales drive the Auburn Automobile Company has started a new organization—The Auburn Club for Master Salesmen. The organization has been established in the interest of every Auburn retail salesman in the country. The first Master Salesmen's Contest officially started October 1 and will extend to May 1, 1935.

Reeders Have Daughter

A daughter, Barbara Adams, was born to Mr. and Mrs. John Reeder on Oct. 7. Mr. Reeder, until recently, was advertising manager of Cadillac Motor Car Co., and is now with Young and Rubicam on the Packard Motor Car Co. account.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business last week was the best for any week so far during this fall under the stimulation of more favorable weather and fewer labor disturbances. There was a further increase in the level of retail and wholesale trade, with wholesale reordering in larger quantities. Business activity indices fell during the week as a result of declines in steel operations, car loadings, and automobile and electric power output. Other branches of industry made a favorable showing. One of the most discouraging developments during the week was a rise in the number of failures among retail concerns.

Freight Loadings Increase

Railway freight loadings during the week ended October 13 amounted to 635,639 cars, which marks an increase of 4,321 cars above those during the preceding week, a decrease of 35,041 cars below those a year ago, and a decrease of 14,051 cars below those two years ago.

Current Production Gains

Production of electricity by the electric light and power industry in the United States during the week ended October 13 was 2.3 per cent above that in the corresponding period last year.

Store Sales Slack

Department store sales during September increased by somewhat less than the estimated seasonal amount. The

Federal Reserve Board's adjusted index stood at 76, as against 79 for August and 72 for July.

Building Contracts Off

Construction contracts awarded in 37 Eastern States during September, according to the F. W. Dodge Corporation, amounted to \$110,219,200, as compared with \$120,014,600 during the preceding month and \$120,134,400 during the corresponding period last year.

Food Prices Decline

After a gradual but steady increase since last April, retail food prices during the two weeks ended September 25 showed a decline. The current average stands at 116.4 per cent of the 1913 average, as against 116.8 percent two weeks earlier and 107.4 per cent a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended September 20 declined for the fourth successive week. The current figure stands at 79.0, as against 79.1 the week before and 79.7 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended October 17 showed no changes in holdings of discounted bills, bills bought in the open market, and government securities.

born in Belchertown, Mass., in 1875, and for a time worked in a watch manufacturing plant in Waltham, Mass. He later became Eastern manager for the Ford company, with headquarters in New York City.

OK Logan Gear Loan; Get Pontiac, Chrysler Orders

Stockholders of the Logan Gear Co. at a special meeting this week approved recommendations made by directors in connection with giving a mortgage to the Reconstruction Finance Corp., to secure a \$150,000 loan.

It was said the funds will provide more than \$75,000 of new working capital and enable some favorable action to be taken on some liabilities in connection with closed banks.

W. H. Schomberg, president, told the stockholders that contracts have been received from Pontiac and Chrysler for certain parts which may be made profitably in the Logan Gear plant, through the aid of the new financing.

The loan will be at six per cent, and will be renewable for at least two years.

Garrison Praise Seen as Majority Rule Endorsement

In accepting the resignation of Lloyd K. Garrison as chairman of the National Labor Relations Board, President Roosevelt commended him for "the fair and practical solutions that you and your colleagues have found for threatened and actual controversies."

Inasmuch as the most important decision made by NLRB during Mr. Garrison's chairmanship was the Houde case, the President's comments are being interpreted in some quarters as an endorsement of the majority rule for representation.

Patterson New Wholesale Automotive Code President

Robert G. Patterson, president of the Piston Service Company of Indiana, heads the wholesalers' code for the October to March period. The other officers are: first vice-president, Aime E. Pouliot, of National Bushing & Parts Co., Minneapolis; second vice-president, W. Norman Potter, of United Motors Service, Detroit; treasurer, Ralph W. Boozer, Central Motor Parts, Indianapolis; secretary, Samuel M. Stone, Stone Wheel & Rim Co., Chicago. The retiring president of the Code Authority, Sidney B. Dean, of Nicols, Dean & Gregg, St. Paul, Minn., retains his place on the executive committee as the sixth member.

E. M. Sheehan, Motive Parts Company of Pennsylvania, Pittsburgh, Pa.,

has been elected to the Code Authority filling the vacancy caused by the resignation of H. N. Nigg, now Secretary of the Wholesalers Section of the National Standard Parts Association.

Frank G. Stewart, Washington, D. C., continues as Executive Secretary of the Code Authority.

Gaston Plaintiff

Gaston Plaintiff, for many years secretary to Henry Ford, died recently at his home, The Hermitage, one of the show places of the Adirondacks.

Mr. Plaintiff had a prominent part in the locating of the Ford Motor Company plant at Green Island, near Troy, N. Y. As Henry Ford's emissary he carried on all the negotiations for the site, building and power rights made preliminary to the founding of the plant. He was

Auto-Lite Gets Packard Ignition Parts Order

The Electric Auto-Lite Co. has been awarded a contract to furnish all ignition equipment for the new small car Packard will produce, it was announced by C. O. Miniger, chairman of the board of Auto-Lite.

Mr. Miniger said this is entirely new business and that the company has been given a long-time contract.

Miss Coyle Married

The marriage of Miss Norma Elizabeth Coyle, daughter of Mr. and Mrs. M. E. Coyle, to Dr. Nelson Moore Taylor was solemnized Oct. 17, at the residence of Bishop Michael James Gallagher.

Varied Groups Join in Protests to President Against Truck Regulation

Apparently there are more groups opposed to the kind of Federal regulation of motor carriers proposed by Federal Coordinator Eastman than the "truck manufacturers, second-hand dealers and brokers" to which he referred in his speech on Monday of this week before the Chicago convention of the American Trucking Associations, Inc. (See page 490). At least that would appear to be the case judging by the composition of the committee representing the Highway Users Conference which called on President Roosevelt to express opposition to some of Mr. Eastman's proposals.

This committee was made up of the president of the National Retailers Council, the Washington representative of the American Farm Bureau Federation, the Washington representative of the National Grange, the president of the National Association of Motor Bus Operators, the president of the American Trucking Associations, Inc., and the director of the National Highway Users Conference.

In addition to discussing regulation with the President the committee presented a brief which was endorsed by a large number of interested associations and made the following points:

1. That interstate motor transport is now subject to code regulation, that great progress is being made in the elimination of improper practices and unfair competition, and that hurried Federal legislation would destroy the benefits and prevent the accumulation of experience and data which could be made the basis of intelligent legislation, if found necessary in the future.
2. That restrictive legislation would adversely affect employment, and that the actual return to the railroads of the small volume of so-called lost business would not increase railroad employment by one man.
3. That the demand for Federal regulation of rates and practices of interstate motor transport is primarily of railroad origin and is "an ill-advised effort to turn back to the railroads that small portion of business they have lost."
4. That the extent to which motor transportation has been a factor in the reduction of railroad business in recent years has been "grossly exaggerated," and that this loss has been more than offset by the large volume of business accruing to the railroads from motor transport sources.
5. That the restriction of highway transportation services would result "in a great increase in the cost of transportation of passengers and commodities."
6. That the rates for highway transportation "must be based exclusively on the cost of the service rendered," without reference to the rate structures of any other form of transportation.
7. That highway users are opposed to the placing of motor transport under the Interstate Commerce Commission.
8. That no blanket form of regulation will fit the conditions, even as regards the "for hire" elements in the motor transportation industry, and that when the period of code regulation is over, bus operations should be dealt with in a separate and independent measure, if Federal legislation is found necessary.
9. That there is serious question as to the possibility of regulating the "for hire" elements in the motor trucking industry effectively "without unduly suppressing the operation of private vehicles used by agriculture and by industry as plant facilities."
10. That the "subsidization" argument advanced as a reason for the "equalization

of competition between rail and motor carriers" wholly overlooks the fact that motor trucks and motor buses, while constituting only 13 per cent of all motor vehicles, pay \$250,000,000 a year, or 25 per cent of all motor vehicle taxes.

This brief was joined in by members of the Advisory Committee of the National Highway Users Conference consisting of the following: The president of General Motors, the executive vice-president of the A.A.A., the master of the National Grange, the president of the American Petroleum Institute, a spokesman for the International Association of Milk Dealers, the American Bakers Association, the vice-president of Kroger Grocery and Baking Co., the president of the Rubber Manufacturers Assn., the president of the National Publishers Association, as well as a large number of agricultural and other associations.

Altogether the support accorded to the views presented to the President indicates rather clearly that there is widespread opposition to the regulatory proposals of the Federal Coordinator and that it doesn't come largely from truck manufacturers.

Steadman Joins Pioneer

Claude A. Steadman has become associated with the Pioneer Engineering & Mfg. Company, designers of tools, dies, gages and special machinery. Mr. Stead-

man was formerly with various motor companies as tool and die engineer, later with the Taft Pierce Mfg. Co., Woonsocket, R. I., and for the last five years chief tool designer for the Wright Aeronautical Corp. at Paterson, N. J.

O. C. Rhode Constructing Welded Steel Frame House

O. C. Rhode, chief engineer of the Champion Spark Plug Co., is building the first welded all-steel frame residence in Ottawa Hills district of Toledo, incorporating several new ideas in fitting the material to the design of an English country home type structure, and obtaining modern results in fireproofing, air conditioning, and heating.

Auto-Lite Plans Extensions

Auto-Lite Company, Sarnia, Ont., will enlarge their factory space and they plan a staff increase from 275 to 400 men.

Big Order for Continental

Continental Motors Corp. has received an order for taxicab motors amounting to \$93,750, delivery to be made between Oct. and Dec. 15. This is a substantial addition to the already large business previously reported by Continental.

CALENDAR OF COMING EVENTS

SHOWS

Cleveland (Automotive Service Industries)	Nov. 19-23
New York Automobile Show	Jan. 5-12
Los Angeles Automobile Show	Jan. 5-13
Washington Automotive Assoc., Automobile Show	Jan. 12-19, 1935
Toronto, Canada Automobile Show	Jan. 12-19
Newark, N. J. Automobile Show	Jan. 12-19
Buffalo, N. Y. Automobile Show	Jan. 12-19
Cleveland Automobile Show	Jan. 12-19
Milwaukee Automobile Show	Jan. 12-19
Detroit Automobile Show	Jan. 12-19
Brooklyn, N. Y. Automobile Show	Jan. 14-19
Philadelphia Automobile Trade Assoc. —Automobile Show	Jan. 14-19
Columbus, Ohio Automobile Show	Jan. 19-24
San Francisco Automobile Show	Jan. 19-26
Baltimore—Automobile Show	Jan. 19-26
Boston Automobile Dealers Assoc. —Automobile Show	Jan. 19-26
Pittsburgh, Pa. Automobile Show	Jan. 19-26
Hartford, Conn. Automobile Show	Jan. 19-26
Chicago Automobile Show	Jan. 26-Feb. 2
Springfield, Mass. Automobile Show	Jan. 28-Feb. 2
Omaha Automobile Show	Feb. 3-9
Kansas City, Mo. Automobile Show	Feb. 9-16
Denver, Colo. Automobile Show	Feb. 10-23
Evansville, Ind. Automobile Show	Feb. 23-27
Minneapolis Automobile Show	Mar. 9-16
Mankato, Minn. Automobile Show	Mar. 16-23

MEETINGS

American Petroleum Institute, Dallas, Tex.	Nov. 13-15
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ANNUAL MEETINGS

Natl. Automotive Parts Assoc., Detroit	Nov. 13-17
Natl. Standard Parts Assoc., Cleveland	Nov. 16-17
Motor & Equipment Manufacturers Assoc., Cleveland	Nov. 19-23
Society of Automotive Engineers—Annual Banquet—New York	Jan. 7
Motorcycle & Allied Trades Assoc., New York City	Jan. 9
American Engineering Council, Washington, D. C.	Jan. 10-12
Society of Automotive Engineers—Annual Meeting—Detroit	Jan. 14-18
American Roadbuilders Assoc., Washington, D. C.	Jan. 22-25
Automotive Parts & Equipment Mfrs., Inc.—Chicago	Jan. 29

CONVENTIONS

International Foundry Congress, Philadelphia	Oct. 22-26
American Foundrymen's Assoc., Philadelphia	Oct. 22-26
National Foreign Trade Council, New York	Oct. 31-Nov. 2
International Acetylene Assn., Pittsburgh	Nov. 14-16
Motor & Equip. Wholesalers Assoc. Annual Convention—Cleveland, O.	Nov. 16-17

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y.	Dec. 3-8
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FOREIGN SHOWS

International Aeronautic Exposition, Paris, France	Nov. 16-Dec. 2
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The Horizons of B

Work or Wages?

AT no time has labor been so deliberately victimized by myopic leadership as it has during the past eighteen months. The working man is human and therefore primarily selfish. Unless he burns with a specific ambition he is like all the rest of us, that is to say, he would like to raise his income and at the same time reduce his exertions. If the incentives are present he will increase his efforts in order to enhance his income.

To this man the labor leader comes bearing the most alluring fruit. The worker is offered an increasing amount of that stream of goods which his own energy produces. How all workers can produce less in the aggregate and yet as a whole increase the amount of food, clothing and shelter which they consume is a fantastic paradox obscured first by the device of money and secondly by easy references to technological proficiency.

Money Magic Versus Energy

The worker has not yet succeeded in penetrating the mystery of money. The number of counters which he finds in his pay envelope appear as real income to him. Thus a rise in wages from \$20 to \$30 a week seems like an increase of 50 per cent in income. If this worker were stranded on a laboratory island with a small group of fellow men who had to wrest a joint livelihood from land and sea he would at once appreciate that the amount of food and other necessities which the group could consume would depend faithfully upon their joint productivity.

He would realize that the mere issue of paper certificates defining the amount of fish, fruit and vegetables which each inhabitant could draw from the collective product could in no way affect the aggregate quantity of

that product. Nor could any manipulation of the certificates—money magic—dollar devaluation—sate his appetite more fully or diminish the energy necessary to survive.

The United States today is nothing more than this laboratory island on a large scale. The number of automobiles, bushels of wheat, bales of cotton, pounds of beefsteak and golf balls which the community produces—and therefore consumes—depends upon the amount of energy expended by the members, the team work, leadership and intelligent use of equipment by the producing team. Yet the worker is told repeatedly and solemnly that an increase in the number of counters used in the complex barter of a civilized community will "increase consumption."

The foregoing observation applies to a general rise in wages and prices. The first interest of the labor leader is to increase the incomes of the workers who support him. If overt conduct and expression are any guide it may be said that no labor leader has yet had the insight and foresight to appreciate that the power to bargain may be abused by labor to the point of self-destruction.

Effect of Prices Upon Consumption

Here again we encounter a principle of economics so simple that its restatement may offend the reader. In a community of static prices any rise in the price of a particular commodity will do one or both of two things. It may force a reduction in the use of that commodity, a resort to substitutes or both. No industry has learned the principle of demand elasticity more thoroughly than the automobile industry. Its sales executives know that a rise in prices at once blocks out a body of potential buyers while a reduction immediately brings new buyers into the field.

Now labor is a service yielded by human agents. The response of the market place to the price of the service is precisely the same as its response to a tangible commodity. In fact every manufactured article is but the corporeal embodiment of a definite number of hours of labor, directed by management and aided by equipment—in turn the product of other labor. If the worker raises his pay beyond the point of consumer tolerance he will be penalized by a reduced demand for his services.

Prima Donnas and Aristocrats

It is not necessary to go far afield for illustrations. The tool and die makers have been the prima donnas of automobile labor. Their pay is relatively high and they have been one of the most disturbing elements in the industry. This has had a definite effect upon the plans of automobile executives for the production of 1935 models. Changes are reported to have been kept at a minimum and some of the work formerly done by Detroit workers has been transferred to other cities. There has been here both a reduction in the demand for services whose price has been pushed out of line and a process of substitution.

The bricklayers of New York City afford another illustration. Only this spring William Green was lamenting the idleness of these artisans alleging that but one per cent of the bricklayers of Gotham had jobs. Possibly their insistence that they receive \$1.75 an hour may have some relation to their leisure.

Great Britain today is having a building boom consisting mostly of small homes of stone and brick construction. She is building six houses for every one which this country is erecting. Her masons and bricklayers are drawing approximately 40 cents an hour.

There are about 27.5 million family units in the United States. Each one is a potential buyer of

Business

by Joseph Stagg Lawrence

a home, a new home in place of the old one or a second home. There are a little more than two million families whose principle breadwinner is dependent upon construction. Labor in this country has attempted to increase consumption by raising the wages of these two million workers. British labor operates on the principle that the consumption of the other 25.5 million families should be increased by offering a greater return for the construction dollar.

Success to the Point of Suicide

In addition to checking consumption directly through excessive demands labor invites a most intensive search for substitutes, for labor saving machinery and for economies which will cut labor costs, i.e., the demand for labor. In the field of construction relentless experimentation and research seek a practicable method of applying mass production technique to building. The finest architectural and engineering intelligence is now being applied to the pre-fabricated house, spurred on by the imprudent labor stand on wages.

For years the anthracite miners have bargained collectively and violently with their employers. This has resulted in repeated interruptions to production as well as a rise in the cost of coal. Consumers of coal changed to oil, gas or electricity. Thousands of new homes are equipped with oil burners. Anthracite coal has entered a period of decline and its decadence is attributable largely to the success of the United Mine Workers.

Cigar Workers Bargain Themselves Out of Jobs

Nothing demonstrates the tragedy of shortsighted labor bargaining more effectively than the experience of the Corona cigar workers. This cigar was formerly made by Cuban workers. They had a tightly closed shop, were arrogant with power and a rather temperamental lot as a

consequence. It was necessary for the management to provide trained readers who entertained the workers with romantic novels and newspapers while they toiled. Those were the days when a cigar of this brand sold for 60 cents. The workers finally exhausted the patience of the management which moved the plant to Trenton, New Jersey. Hard working Jersey girls have taken the place of the Cuban artists. The cigars have not suffered in quality. Their price has been reduced from 60 to 35 cents and the consumption has been increased fourfold. This is a direct inversion of the theory of stimulated consumption now advocated by organized labor.

Hastening the Introduction of the Machine

Little has been said here of the effect of higher wages upon the introduction of machinery chiefly because it is among the more obvious consequences. Management will not stand by supinely and suffer its markets to disappear through rising costs. An increase in wages immediately raises the advantage of the machine. Equipment which formerly could not justify its cost will do so if the service which it may displace comes too high. This is precisely what happened in the textile industry. Labor witnessed a decline in the demand for its services because the price of those services had risen. This is a price-demand relationship which no amount of collective bargaining can alter.

Labor Theories and Recovery

No group has been so articulate in the demand for recovery stimulants from the government as organized labor. Each month William Green releases the figures on unemployment and uses them as the text of a grievance against the failure of the administration to do enough for the worker. The wail is usually accompanied by labor's solution—shorter hours and higher pay.

This position again calls for elementary economics. Opportunities for labor must first be devised or discovered by the employer. Labor had little if anything to do with the conception of air conditioning, its experimental development or the cultivation of the market. These are all stages in the creation of thousands of new jobs. Honest labor should ask itself if union organizers or enterprisers with capital, courage and foresight have created this demand for their services.

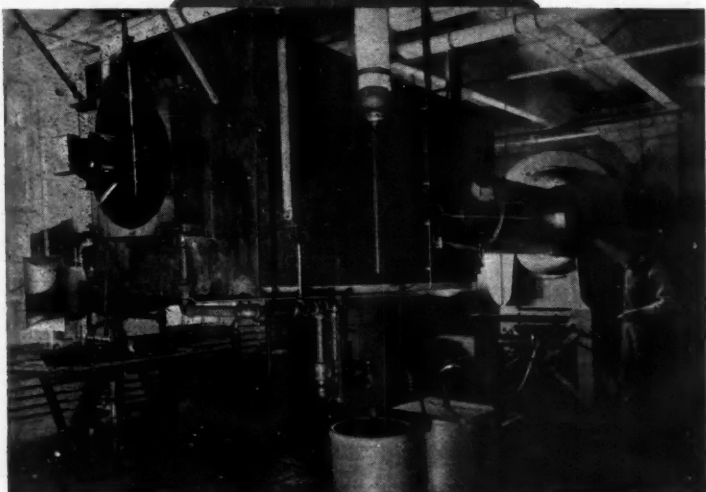
The promoter; the capitalist and management must be able to obtain in the market an amount sufficient to cover their costs and leave some reward for their own risks and efforts. Clearly if labor demands an excessive return the incentive to industrial pioneering and consumer exploration is diminished. Thus fear of unreasonable wage demands tends to discourage new industries and this is one of the major reasons for recovery's failure to date.

Disturbing Recovery Sequence

Another is to be found in the timing of wage increases. In all previous recoveries business volume was first raised. This resulted in a demand for more labor. Greater activity brought firmer prices. As gross income mounted and labor was employed more fully the employer was in a position to pay higher wages. Note this. The employer first received from the market the means with which to pay higher wages.

Today that sequence has been reversed. The wage earner was first given a succession of advances and the employer has been left to recover his greater costs as best he could. The business record—and here we place in the most conspicuous position William Green's figures on unemployment—shows that recovery has been halted and that the worst victim has been the workingman. He is worshipping false gods.

Fluctuating Factors in Parts Production Quick and Easy Adaptability



Huge wind tunnel in Young Radiator laboratory for testing the performance of large industrial units

PROGRESSIVENESS in manufacturing methods—metal cutting, assembling and other related activities coupled with the utilization of the latest production equipment—is characteristic of the automotive industry.

For a number of years the Production Issue of *Automotive Industry* has brought to its readers an annual resume of production high spots in this great industry. Now for the first time, an entire issue has been devoted to the activity of the parts makers—that vast aggregation of suppliers to the assembly lines of the builders of cars, trucks and tractors, industrial equipment, and aircraft.

The extent and economic significance of what we call the parts business are not generally realized. For that reason we are presenting in this issue a survey which shows, among other things, the number of concerns, running well into the thousands, whose business is either wholly or largely the supplying of parts and materials to the complete vehicle manufacturers.

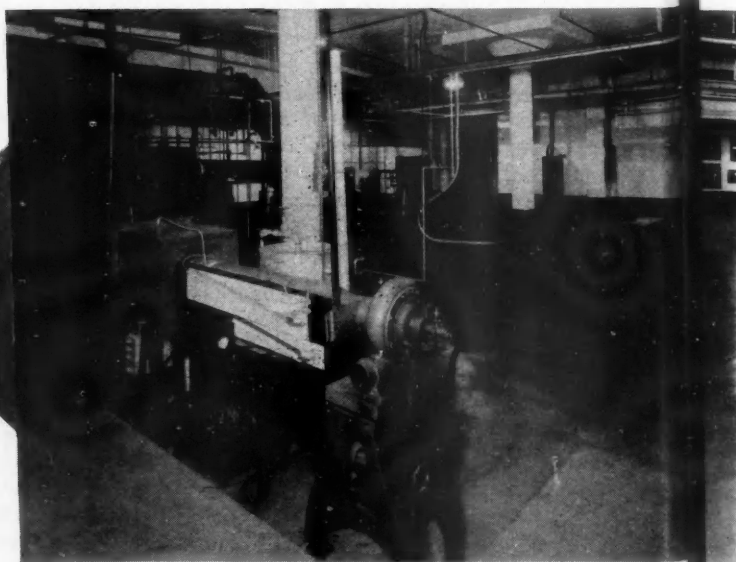
By far the most striking feature

of the parts industry is the vast amount of commercial and fundamental research which has continued uninterruptedly through the ebb and

flow of business conditions. It covers every type of product; it is the essence of automotive progress and it forms a vital part of the foundation upon which better vehicle performance and service to buyers rest.

We offer a few—just a few—examples to indicate the character and variety of the facilities with which the parts makers have equipped themselves to carry on this all important work of research. No such presentation, within the limitations imposed upon us, could show adequately the magnitude of the field of exploration and experimentation in which this work is regularly being done. But let us look at some parts makers' laboratories which are new, unique or especially interesting.

Here is an engineering laboratory recently placed in operation by the



Views of the McCord engineering laboratories. In the center, background, is the 150 hp., 6,000 r.p.m. hydraulic dynamometer used principally in the development of gaskets.

Production Call for of Equipment

by Joseph Geschelin
Engineering Editor, Automotive Industries

Another corner in the Electric Auto-Lite laboratory—this is a part of the ignition test benches



McCord Radiator & Mfg. Co. Devoted exclusively to the study of heat transfer problems, it includes a large wind tunnel for testing full sized radiators and smaller units for testing standard experimental cores. One of the most important pieces of equipment here is a new hydraulic dynamometer used in the investigation of gaskets for engine service. Heat effects, variations in compression ratio, service life, many related subjects, can be studied and the results embodied in the product before it is offered to the engine builder.

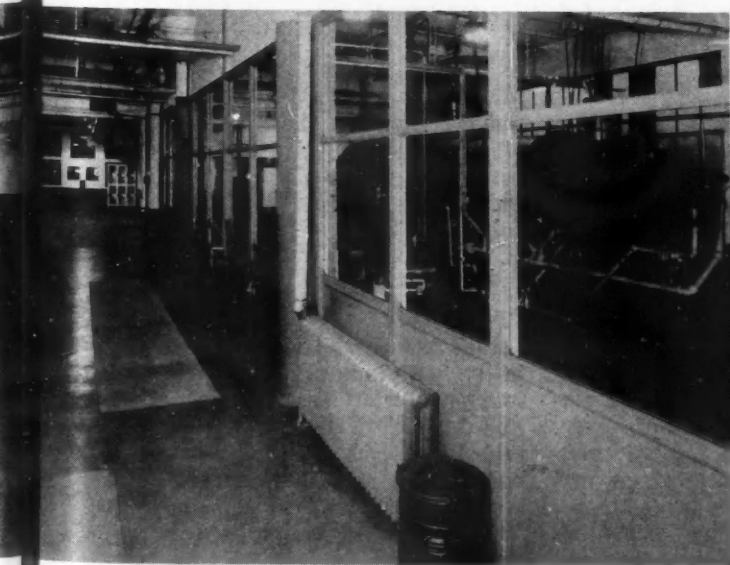
Young Radiator Co. specializing almost exclusively in the heavy-duty and industrial radiator field also provides an outstanding service through its engineering laboratory. Among the many interesting items of equipment found here is the huge wind

tunnel with capacity for handling the large industrial units, as well as small wind tunnels for the testing of standard core sections.

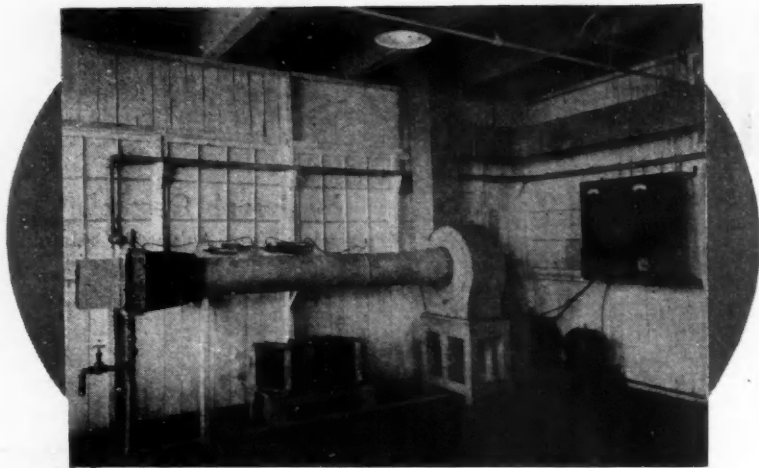
In the electrical field, the Electric Auto-Lite Co., for example, has set apart vast facilities exclusively for research on and development of starting, lighting, and ignition equipment. Views in several of the laboratories are shown here. This program played an important role in the recent development of high capacity generators which meet the heavy electrical loads of modern cars, particularly when radio-equipped. Here also was developed the line of two-stage voltage regulators placed on the market last season.

Eisemann Magneto Corp., famed builders of magneto ignition for heavy-duty and special applications, also has greatly expanded its engineering laboratories and now boasts one of the finest ignition research departments in the industry. It features electric dynamometers, test benches for complete units, and many items of precision scientific apparatus for fundamental studies.

Then there is the Champion Spark Plug Co. as another illustration with its newly equipped laboratory comprising the latest type of dynamometers and other set-ups for ignition



On the right is the large wind tunnel for testing complete radiators



View of small wind tunnel used by Young Radiator for testing small standard cores—one is in place, four others are under the tunnel. The apparatus is provided with two Pitot tubes, switch board, and a motor generator set for variable speed control of fan and blower

research and thermal studies. Only this type of activity can keep abreast of present day engine developments—higher speeds, increased compression ratios, and greater thermal effects.

The foregoing is just a fragment of the seething activity in this industry but it shows convincingly why these specialists are so important to the automotive industry at large. No individual manufacturer could possibly parallel this work in all its ramifications. That's why, to our mind, the specialists can be relied upon as unfailing sources of the new, the better, at most economical price levels.

What of the economic and production problems of the parts business? Consider first the field.

These allied producers make component parts and/or complete units for standard equipment, also as replacement parts to the industry and the trade. Volume depends upon the fluctuating activity of the automobile manufacturers, truck builders, and producers of industrial equipment—also upon the general activity in the service and retail field.

Since production depends upon seasonal fluctuations beyond the control of these manufacturers, also upon style changes in the product, the first characteristic of many parts

makers is that of great flexibility. In effect they are really jobbing shops on a grand scale. Small wonder therefore that the majority of plants have equipment of the simplest general purpose variety—drill presses, many of single-spindle type, milling machines, engine lathes, screw machines, turret lathes, grinders, etc.

Yet there are others, making small interchangeable parts on a large scale or manufacturers of specialties such as batteries, piston rings, tires and the like, who use highly specialized production equipment, some of which is built in their own tool rooms.

Flexibility, then, is the greatest attribute. Each organization works out its own salvation making this phase an inspiring epic of mechanical inventiveness in the development of simple universal tools and attachments that permit of quick changes in set-up, inexpensive tool setting, and consequent low burden charges to the product.

How long the present philosophy of job shop manufacturing is to persist is a matter for conjecture. Great developments along this line are in the offing—a new order of unit-type equipment capable of equal flexibility but with greater potentialities of cost-reduction seems to be just around the corner.

Progressive elements quick to sense the economic advantages of the new order will probe these possibilities and thus will assure their present impregnable security.

The following section of this article is devoted to a brief commentary on a small but representative group of manufacturers who were visited by the writer recently. This is supplemented by an important pictorial presentation of their production facilities.

Ackerman-Blaesser-Fezzey, Inc.

THE well-known line of "Common-Sense" window regulators and other items of body hardware are products of Ackerman-Blaesser-Fezzey, Inc. As an example of the chief activity in this plant, we have shown in the pictorial section a view of a section of the pressroom busy on the production of a new line of window regulators.

These presses are being used at this time on stampings for regulators of comparatively recent design, featuring a horizontal movement in the glass as well as the conventional vertical lift; also types for only horizontal movement of the glass.

It will be noted that in this shop practically all presses are equipped with what is known as the Positive

Safety Device. By means of cables attached to the arms of the operator each revolution of press automatically pulls his arms sufficiently away from the press to prevent possibility of accident.

Bower Roller Bearing Co.

POWER ROLLER BEARING CO., makers of roller bearings in a wide variety of types and sizes, employs a great many items of equipment peculiar to this type of product, including automatic screw machines up to the very largest sizes built, precision grinders and lappers, punch presses, degreasing and plating equipment, etc.

Perhaps the most striking equipment here is a battery of Heald in-

ternal centerless grinders which automatically finish the inside surfaces of bearing races. Machines are hopper fed so that the only function of the operator is to keep the hoppers full.

E. G. Budd Mfg. Co.

IT is conceded by welding experts that the outstanding achievement in the body industry during the current production season may be credited to the E. G. Budd Mfg. Co., famed makers of all-steel automobile bodies. Its contribution to the art is the development of the six-point flash welder which is used in the Budd Detroit plant in the final assembly of an all-steel monopiece body.

Two striking views of this ma-

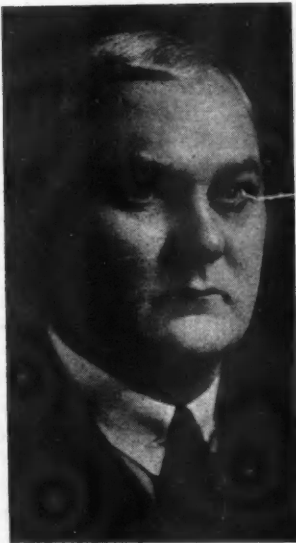
chine are shown in the pictorial section. Briefly, the machine completes the welding of an entire sedan body in one setting. Its capacity is 54 bodies per hour.

In operation, the machine takes the two side panels, back panel, peak panel and cowl panel and joins them simultaneously in the six principal seams—two at the back panel, two at the peak panel, and two at the cowl.

The general activity of the E. G. Budd Mfg. Co. is well known to readers of *Automotive Industries* by virtue of the series of articles that have appeared here from time to time. The company has plants in Philadelphia and Detroit, as well as associated plants in England, France and Germany, and in addition to its familiar line of all-steel bodies, wheels and brakes, has pioneered the shot-welding process of fabricating stainless steels, out of which has grown the development of high tensile structures for motorized railroad equipment, as epitomized by the Burlington Zephyr.

Champion Spark Plug Co.

WITH service to the industry based upon a program of continued fundamental research, the Champion Spark Plug Co. recently



CHARLES A. DE WAR
Factory Manager,
Champion Spark Plug Co.

completely remodeled its testing laboratory and installed new dynamometers. In the opening section of this article we have shown a corner of the new laboratory with Chief En-



Section of engineering laboratories at Electric Auto-Lite. Here are the dynamometer test panels recording the characteristics of starters, generators, etc.

gineer O. C. Rohde at the instruments during a test of the thermal rating of plugs.

Most of the metal cutting and final assembly is done in the Toledo plant, while insulators are made in the Detroit plant.

Several new items of equipment installed recently for the purpose of improving quality and cost-reduction are shown in the pictorial section. One of these is a new draw bench for cold-drawing steel bars, with a capacity of 100 tons per day. Another is one of a battery of special Davenport automatics tooled up for producing knurled terminal nuts. This machine turns out 130 pieces per minute. An interesting feature of this machine is the built-in lubricating system with individual oil leads to every lubrication point.

Cleveland Graphite Bronze Co.

ABOUT the time this issue goes to press the Cleveland Graphite Bronze Co. truly will be one of the show places of the automotive industry. Visualize, if you can, a factory operating large groups of punch presses, broaching machines, and the like, usually associated with basement galleries, greasy floors and grimy operators. In this plant, normally employing 1500 people, it's entirely different.

To Ben Hopkins, president of the company, the manufacture of a precision product such as a high-grade engine bearing is concomitant with clean, light work places and clean, bright operators. In keeping with this ideal, every part of the plant is painted white; every machine, no matter what its function, is painted in cream color. But paint alone is not enough—machines need lubri-

cant, tools require lubrication, and this must be controlled if the place is to remain clean.

The answer is found in a self-contained lubricating system built into every machine tool. It consists of individual self-feeding oiling units attached at every lubricating point—see the dark oilers on the presses in the illustration in the pictorial section. This system was developed and installed by C. T. Meyers, well-known automotive engineer.

Given a clean work-place, clean surroundings, and machines that do not leak or squirt oil and grease, the operators can dress in white (as in a bakery) and on the basis of all practical psychology should be better workers and certainly better fitted to produce a quality job. This spirit



GEORGE S. SALZMAN
Production Manager,
Cleveland Graphite
Bronze Co.

is being fostered by the installation of special conveniences for employees—shower bath facilities, locker rooms, etc.

As is well known, the company specializes in the manufacture of bushings, bearings and washers. It is one of the largest producers of steel backed engine bearings and is now engaged in the development of a new line of thin walled, steel backed, copper-lead bearings of very high lead content for use with soft crank journals. In the engine bearing line the manufacturing process, tooling, and inspection has as their objective the maintenance of extremely close tolerance—plus 0.00025, minus 0.00000 in. on wall thickness and parting line height.

Cuyahoga Spring Co.

THE Cuyahoga Spring Co. is representative of a group of spring specialists making a great variety of coil springs and specially formed springs for many purposes. The automotive line includes the gamut of valve springs, brake linkage springs, starter springs, tire valve springs, etc., distributed almost exclusively to the replacement trade.

The views in the pictorial section show two important operations in the factory—one illustrates the grinding of spring ends accurately to length in the special double end grinder. Note the nesting of springs, each in its retainer, in the grinding fixture.

The other photograph takes in a corner of the heat treating department where the desired properties are imparted under controlled metallurgical conditions.

Heat treatment of springs for valves is a highly specialized operation and requires a thorough knowledge of various car manufacturers' requirements to determine the grade of material best suited for a particular engine. Equipment used here for accurate and uniform temperature control is not standard, but rather a development based on many years of experience with the various types of steel used for making springs. The company uses gas fired as well as electrically heated furnaces controlled automatically for temperature as well as atmosphere, which is highly important in eliminating oxidation or scale.

Eaton Detroit Metal Co.

It's on— $\frac{1}{4}$ turn—it's off. That's the Easy-On cap made by the Cleveland plant of Eaton Detroit Metal Co. (Eaton Manufacturing Co.



R. P. Smith
Factory Manager Axle Plant,
Eaton Mfg. Co.

subsidiary.) These caps are produced in a large plant in Cleveland, the company also operating a plant in Detroit.

In addition to large press shop facilities this company has a big electroplating department equipped with automatic conveyors. The plating finishes include—chromium, nickel, copper and cadmium. Caps are also supplied in baked enamel, parkerized and in stainless steel.

The pictorial section shows a view in the press shop at a battery of heavy-duty inclined presses. Another view is taken in the polishing department.

Electric Auto-Lite Co.

FUNDAMENTAL research and commercial development in the field of electric starting, lighting and ignition systems are perhaps the most important activities, apart from manufacturing, at the Electric Auto-Lite Co. Some views taken in the electrical and ignition laboratory sections serve to show a part of the great facilities set up for engineering and research directed to the improvement of electrical equipment as well as the development of new ideas.

Several views shown in the pictorial section will give a general idea of the factory layout and the type of equipment used in the plant which was put into operation about five years ago.

A complete materials handling system consisting of overhead conveyors of various descriptions as well as other forms of handling, such as the gravity chutes at the drill press line, are perhaps as striking as any-

thing else that may be seen in this plant. Cooper Hewitt lighting gives daylight conditions at the work places and adds largely to the ability of producing high quality at reasonable cost levels.

Ex-Cell-O Aircraft & Tool Corp.

THE Ex-Cello-O Aircraft & Tool Corp. is an example of the rare combination of talents that characterizes an enterprise serving the industry in the capacity of a precision parts maker on the one hand and a machine tool builder on the other. In addition to a varied line of tools, broaches, drilling heads, jig bushings and precision parts for aircraft, etc., this company has recently started the manufacture of a Diesel engine fuel system that has attracted wide interest.

To illustrate some of the unusual operations that have been developed here in the manufacture of precision parts, we give below a description of the method used to produce steel worms and another set-up devised for breaking the sharp edges and corners on accurately finished parts.

On precision parts many times there are sharp corners and edges that should be broken in the final operation. To illustrate this operation, the photograph in the pictorial section shows an economical and practical method of handling which is much faster than the former method of hand stoning.

"An air turbine spindle running at approximately 35,000 r.p.m. is equipped with a collet type chuck adapted for holding pencil wheels ranging in diameter from $\frac{1}{8}$ in. to $\frac{3}{8}$ in. It is an easy matter to properly dress the wheel, enabling the operator to get into difficult corners, slots, angles, radii and similar classes of work. The unusual rigidity of the spindle is responsible for the improved quality of the operation performed.

The photograph illustrates breaking the sharp edges on each side of the slots in aircraft valve guides and valve tappets. The same principle can be used on any type of precision part that is practical to handle."

There are many applications requiring steel worms where accuracy and quiet operation are important factors. The photograph in the pictorial section shows a triple lead worm and the set-up required for grinding it. A shaft, of which the worm is an integral part, is standing in a vertical position on the top of the machine and a second shaft is in position for grinding.

The worm is made of carburized

and hardened material with a Rockwell of 58 to 60 on the "C" scale. The amount of stock left for grinding is determined by the extent of distortion in the heat treating. Normally, approximately 0.015 in. to 0.020 in. stock is left on the diameter. The lead of the finished product is controlled by a master lead screw shown in the head stock at the left end of the machine. By changing this master any lead can be easily obtained.

At the right and top of the machine is the adjustable wheel head with an individual motor drive. A wheel dresser is located on each side of the grinding wheel for accurately dressing the wheel. The flexible tubing running down toward the grinding wheel provides a special gear grinding oil to the worm while it is being ground.

Federal-Mogul Corp.

FEDERAL-MOGUL CORP., one of the great names in the automotive industry, is justly proud of its modern foundry which specializes chiefly in the non-ferrous metals. The foundry is distinguished for its laboratory control of all foundry materials and processes, also the modernity of its materials handling system and foundry equipment.

This organization is responsible for a great variety of products, including bronze-backed, babbitt-lined bearings, steel-backed, babbitt-lined bearings, babbitt metals, bronze bushings and washers, bronze castings of various kinds, and a line of marine and industrial propellers. The research division is a very active part of the organization and recently has done considerable work on main bearings of steel-backed cadmium alloys, said to have great impact values and unusual resistance to high temperature effects. An announcement of this line is to be made in the near future.

Perhaps the outstanding characteristic of the factory is its use of common general purpose equipment, such as single spindle drill presses, screw machines, lathes, turret lathes, punch presses, etc., which are endowed with great flexibility and a high order of productivity through the use of special devices such as universal chucks, universal drill jigs, etc. These attachments are so designed as to permit the handling of a large variety of similar parts over the same set-up.

A fine example of this is the special universal chuck for holding propellers in a turret lathe while machining the taper hole in the hub.

Through the use of knife edges and a simple chuck mechanism for holding the hub, this fixture will accommodate, without change, three-blade propeller castings from 8 to 26 in. in diameter, and any blade pitch up to 30 in., and either right or left hand.

The operation consists of drilling, rough taper ream, finish taper ream, and face one end. The set-up involves only a change in turret tooling.

Automotive main bearings are held to a tolerance of 0.00025 in. on wall thickness and the parting line height, this being achieved in the final broaching operations which finish the bore and parting line dimensions to precise limits. Not content with the invariable accuracy of the broaching operation, this department checks each split or half-bearing for height in the universal inspection fixture shown in the pictorial section. It is designed to take a variety of adapter gage blocks and has a capacity up to a 6-in. O.D. bearing. Average time of change-over is about 1 min.

A cushioned air cylinder operates the vertical ram which contacts one side of the bearing, forcing the other side against a fixed drop on the gage block. The indicator reading is first set to zero with the master gage in place, then a comparative reading is taken with the bearing in place. A speedy hand-operated ejector is provided.

Perhaps one of the most striking examples of the mechanical ingenuity evident at every turn is the screw machine set-up for turning flanged bearing shells utilizing a split cross-slide operated by a right and left-hand screw; also the use of universal tool blocks consisting of threaded arbors with slotted openings to receive the tools, with hexagonal nuts for

positioning and locking the tools. Due to the simplicity of the set-up, the entire block with arbor and tools can be quickly removed and set aside for the next run.

Gemmer Manufacturing Co.

THE accompanying illustration is a view of one of the production sections in the plant of the Gemmer Manufacturing Co., well known makers of automotive steering gears. The Detroit plant takes care of the requirements of some of the largest manufacturers in the industry.

In keeping with the great variety of models and specifications demanded by its customers, Gemmer has a factory which features flexible production equipment capable of meeting style changes and tool changes economically and with the minimum loss of interruption of schedules.

One of the most interesting lines in the plant is the main assembly which is threaded by an overhead monorail conveyor on which the finished gears are hung. The conveyor line is closed, i.e., rotary, and bounds the final inspection department where the assemblies are inspected 100 per cent.

Handy Governor Corp.

MANUFACTURING facilities of the Handy Governor Corp. consist essentially of flexible, general purpose equipment comprising punch presses, drill presses, small lathes and assembly stations for the production of a line of engine governors, air cleaners of the oil wash type, oil filters and a new line of Self-Kleen oil filters. These products are supplied as standard equipment, replacement, and to the trade.

One of the most interesting oper-



Cutting helix of steering gear worms at Gemmer Manufacturing Co.

ations to be seen here is the production of the filter element of the Self-Kleen Oilfilter, illustrated in the pictorial section. The set-up is on a South Bend lathe tooled for the purpose.

The operation consists of turning, threading and winding the filter element which is a heavy brass cage containing 20 slots. The O. D. is turned and then threaded—96 threads per min., each thread 0.005 deep. Lead is held to very close limits, since the thread serves a locating groove in which is wound one long piece of accurately drawn tinned alloy steel wire 0.008 in. in diameter, allowing a space of only 0.00241 in. This space can be reduced to any fineness (as small as 0.0004 in.) by increasing the wire diameter.

One of the larger presses, Toledo No. 55½, is used here for drawing drum type oil filter shells. These shells, 6 in. in diameter and 2 in. deep, are drawn of 18-gage steel strip in one operation.

Holley Carburetor Co.

IN the pictorial section we have shown a close-up of one of a large group of ignition testing machines used by the Holley Carburetor Co. in the production testing of complete ignition systems.

The speed of these machines is checked by the use of a calibrated tachometer and the electrical input and output of the unit is measured by ampere and milli-ampere gages. The pointer which is attached to the same shaft that drives the distributor and revolves inside of a graduated ring, registers the exact firing point by means of the spark that jumps from the pointer to the ring. These testing machines correspond exactly to the automobile motor, consequently the initial setting of the distributor is made directly on the production line. Any speed is obtainable on the test machines so that the governor curve can be checked at any speed.

Lavine Gear Co.

OUT in Milwaukee, under the leadership of Ben Twyman, the Lavine Gear Co. has been geared up to produce the "ball-drive" steering gear for passenger cars which was described in *Automotive Industries* recently.

A fundamental feature of the new gear is the process of making the worm cams—a patented method. The worm cams are first turned from a solid steel bar then the thread is cut on a No. 3 Landis machine with



B. W. TWYMAN
Vice-Pres. & Genl. Mgr.,
Lavine Gear Co.

special chaser heads which form a full radius tooth.

The work is then routed to a special turret lathe set-up incorporating a chuck which holds a fixture containing four balls of the same size as those used in the steering gear. The worm cam is mounted on an arbor held in the turret and advanced through the fixture in the chuck while the latter is in rapid rotation. By this arrangement the cam is threaded through the accurately sized balls which correct the concentricity of the worm and produce a smooth burnished finish similar to an electroplate.

The work is passed through the quill of the machine and removed from the outer end.

McCord Radiator & Mfg. Co.

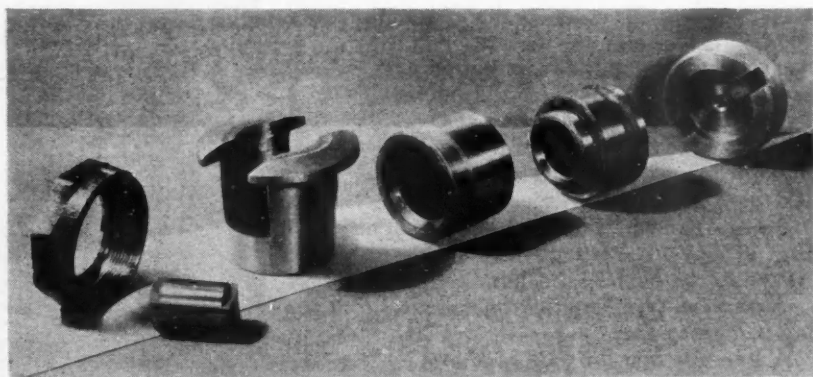
MCCORD RADIATOR & MFG. CO., originally a radiator specialist, has branched out in its activities to embrace a wide variety of products, some outside of the automotive field. Some indication of the variety of activity as well as the

character of the production facilities may be gained by going over the following list of automotive products being handled at the moment; passenger car and truck radiators, cores and brass fittings and stampings for these radiator shells, radiator grilles, hot water heaters for automobiles, steel-asbestos and copper-asbestos gaskets for passenger car and industrial engines, and an individual lubricating system for machine tools.

Apart from heavy and light duty presses supplemented by special tooling, a large part of the plan houses facilities for building, assembling and testing radiator cores and complete radiator units. This includes a complete electroplating department originally designed to handle a large volume of chromium plated radiator shells and now handling a variety of work, such as plating of shells, grilles, parts of car heaters, etc.

Perhaps the most important activity here is the recent installation of an outstanding engineering laboratory designed for the investigation of problems of heat transfer. In addition, the laboratory features a new hydraulic dynamometer used principally in the development of engine gaskets. Through the use of this equipment, gasket development is now independent of field research, since the study of the effect of varying compression ratios, thermal conditions, etc., can be observed and taken care of in the design of the gaskets before they are submitted to the engine builder.

As shown in the illustrations in the earlier section of this article, the laboratory equipment includes a large wind tunnel for testing complete radiators, a small tunnel for determining the characteristics of radiator core sections and other heat transfer units; and the 150-hp 6000-r.p.m. dynamometer for gasket investigations.



Group of knee-action parts being produced by The National Acme Co.

With the large wind tunnel, air velocities of 100 m.p.h. can be attained and 400 lb. of water can be circulated per minute at any desired temperature. All tunnels are provided with accurately calibrated draft gages as well as with remote reading thermometers mounted on boards at central locations.

The laboratory is supplemented by a modern tool room provided with equipment for the experimental manufacture of heat transfer units. This department makes the necessary tools and dies and produces complete units for experimental use in the service field as well as the laboratory.

National Acme Co.

THE National Acme Co. is another of the select group of manufacturers having the dual role of building machine tools and small tools for the industry, while serving simultaneously as a parts maker through its facilities as a contract manufacturer.

The latest job here is the production of a varied assortment of knee-action parts, illustrated. And just to prove that they practice what they preach in the way of modernization, the department for producing these parts has been equipped with the latest screw machine equipment on the market.

In the pictorial section you will find a view of the knee-action department which has been running double shift since the first of the year. The machine in the foreground is a Gridley model R automatic of 3½ in. capacity for handling the parts of larger diameter. Other machines in this department range from ⅞ to 3½, all of the type placed on the market only a few months ago. (See *Automotive Industries*, May 5, 1934.)

This large diameter piece is being produced at the rate of 120 per hour which is said to be at least 5 per cent faster than was possible with the older screw machines.

The Simmons Mfg. Co.

A MANUFACTURING program involving a total of 2500 different parts subject to style changes and daily fluctuations in demand is the task set for the factory management of The Simmons Manufacturing Co., makers of a wide line carburetors and mufflers, silver King hydraulic jacks, and replacement parts for Ford and Chevrolet.

To build these parts in relatively small volume and yet meet the list price set by the car manufacturer is a neat problem demanding great re-



H. E. LEMMERMAN
Works Manager,
The Simmons Mfg. Co.

sourcefulness. It seems only natural to find that most of the production equipment is of general purpose type since it offers complete flexibility and low overhead burden.

The way that costs are met is as follows: based on previous experience, parts are placed in production only after careful analysis of anticipated sales volume; then all tool costs and repair charges are allocated to the job and amortized over one, two or three years as the case may be. Each part has its own tooling which is kept separately in the tool crib and charged out as the set-up is scheduled.

All finished parts undergo 100 per cent inspection to assure quality and conformity to specifications.

Below is given a list of the type of production equipment found in this factory:

Bausch Multiple Drills
Punch Presses
Potter & Johnson Automatic
Cleveland Automatic Machines
Gridley Automatic Machines
Fay Automatic Machines
Engine Lathes

Tapping Machines
Gear Cutters
Ingersoll Milling Machine (for
milling cyl. heads for Ford)
Turning Machines
Milling Machines.
Cylindrical Grinders
Disc Grinders
Turret Lathes
Porter & Cable Lathes

Spicer Mfg. Corp.

SPICER MANUFACTURING CORP. features one of the most interesting production layouts in the parts industry. One of the first in the automotive field to be laid out for straight line manufacturing, the plant breathes the very essence of extreme flexibility and quick adaptability to product changes and shifts in delivery schedules.

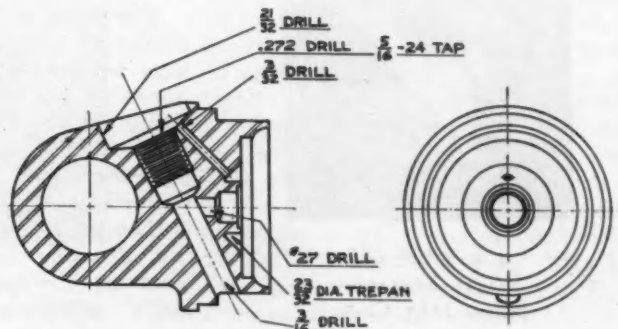
The major part of the equipment is of general purpose type to permit of frequent set-ups as well as changes in the character of work going over the line. Overhead the manufacturing department is provided with flexible electric power connections which permit the shifting of machines from point to point without regard to availability of power since it is possible to plug in at any point in much the same fashion as any home convenience.

Foundations are so designed that while the machines are anchored permanently they can be readily unshipped and moved elsewhere on a moment's notice.

It is said by the factory management that the flexibility of this layout has solved their problem of meeting style changes, changes in schedule, and particularly the ability to tool up for new products. Therein also lies the secret of holding overhead burden to extremely low levels, thus enabling them to produce and hold volume in a very competitive field.

Although most of the equipment is universal in character, here and there are departments featuring the latest in special purpose machines

Miscellaneous drilling and tapping operations completed in one setting in Kingsbury machine recently installed by Spicer Mfg. Corp.



and assembly lines. This is characteristic of interchangeable parts for high production units for the industry in general or for special customers.

Four of the new special purpose machines in this category are shown in the pictorial section of this article. One is the new vertical hydraulic broaching machine recently announced by the American Broach & Machine Co. It is used for machining the inside surfaces of a universal joint yoke and replaced a battery of milling machines formerly used for this purpose.

Another of the new machines is a double end Thompson-Gibb seam welder which joins the forgings to the tube at the top and bottom of the Spicer tubular shock absorber in one operation. The machine produces 3000 units or 6000 welds per day.

Perhaps one of the most interesting pieces of equipment is a Kingsbury eight-station automatic indexing machine with six automatic drilling units and one automatic tapping unit, for finishing the forging shown here. Probably the most interesting event in the cycle is the so-called trepanning operation, performed with a combination tool carrying inserted blades which cut a 23/32 in. angular groove. This tool also carries the No. 27 drill.

The operation is performed by reaching across the indexing table with the spindle of a drilling unit mounted on a tunnel type column above the unit at station 7. At each stroke, the tool enters a hardened guide bushing, located in the work holding fixture, thus assuring accuracy.

How much of a factor the matter



E. A. McBRIDE
Gen. Mgr., Main Plant,
Thompson Products, Inc.

of flexibility is, at Spicer, may be gained from just a cursory examination of some of the activity that goes on within the boundary of this compact plant. Among the products made here are: the new tubular shock absorber, custom built shock absorbers, several types of heavy-duty transmissions, several different types of universal joints, and heavy-duty rear axles.

Thompson Products, Inc.

THOMPSON PRODUCTS, INC., with manufacturing plants in Cleveland and Detroit is best known for its wide line of automotive parts among which might be mentioned such units as—valves, valve seat inserts, pistons, piston pins, water pumps, tie rods, dray links, and brake rod assemblies.

One of the major developments in current production is the line of inserted valve seats which were produced in great quantity for the automotive industry by this company in the past year. To facilitate the great volume at the lowest cost consistent with the requirements of quality, the company has installed a number of Heald automatic chuckless internal grinders for grinding the inside diameters of the rings, representing one of the most recent developments in precision grinding equipment.

The rings are fed in vertically by means of a hopper, each ring dropping between a pair of rollers on a horizontal axis with a horizontal guide bar supporting the work from the bottom, similar to the feed wheel, grinding wheel and guide bar on a centerless grinder. The seat angle is then ground with the same roughing, dressing and finishing operations as the regular Heald "Size-matic" grinder employs.



J. E. PADGETT
Works Manager,
Spicer Mfg. Corp.

Tillotson Manufacturing Co.

BUILDING a line of over 48 models of carburetors ranging in size from 3/8 to 2 in., the manufacturing facilities of The Tillotson Manufacturing Co. are characterized by the use of general purpose production equipment consisting chiefly of light and medium sized drill presses. This is made possible because the zinc alloy die castings require very little metal cutting except for boring, drilling, tapping, counterboring, etc.

The view shown in the pictorial section is an interesting shot in one of the drill press sections.

The factory management has been alert to the uses of new cutting materials and has found great satisfaction in the use of Carbobloy for boring the valve throats of cast iron and zinc alloy bodies. When boring zinc in diameters ranging from 1 3/16 to 1 5/16 in., tool life runs about 15,000 pieces between grinds; on cast iron, 1 7/16 in. diameter, tool life is about 3000 pieces between grinds.

Tool speed on this operation is about 50 per cent faster than with high-speed steel but the greatest economy lies in the greater tool life between grinds.

It is interesting to note that all carburetors are finished-tested before shipping. This operation is handled on the production flow meters shown in the pictorial section, checking two key points—idling and wide open throttle.

The Tillotson line includes carburetors for trucks and tractors, outboards, and industrial units of every description.



A. E. PAYNE
Factory Manager,
The Tillotson Mfg. Co.



H. W. LORMOR
Works Manager, Willard
Storage Battery Co.

Willard Storage Battery Co.

SO specialized is the business of the Willard Storage Battery Co. that most of its production equipment is of proprietary nature and is built in the manufacturing tool room department.

In view of the specialized equipment, we have selected several examples of materials handling, so well planned here and which has much of general interest value. The first of these conveyors is a portable device for unloading battery containers from freight cars to the main conveyor system; the entire section can be rolled from car to car at any point along the dock. This conveyor, the first section of an 800 foot system, transfers the containers to an overhead belt which delivers them to the electrical inspection station.

Over 12,000 containers pass over the line daily. Each container is placed in an electric tester which submits the partitions and walls to a 30,000 volt discharge, sufficient to find any flaws. The raised medallions on the containers are painted and the containers sent on to the assembly lines.

The second conveyor is in the form of a vertical merry-go-round in which the containers are delivered to the assembly line (one of four, shown in the pictorial section) through an air heated chamber by conveyor and placed on assembly conveyor. The elements, composed of plates and connecting straps with insulators inserted and covers in place, are placed in the container compartments. The batteries continue down the line for further operation of sealing, acid filling and top connector application. After final

line inspection the batteries are sent to charging room or shipped bone dry when made with Willard Threaded Rubber Insulation.

Young Radiator Co.

YOUNG RADIATOR CO., specialists in the manufacture of radiators for heavy duty truck, tractor, and industrial units are an outstanding example of the spirit of research upon which the foundation of the automotive industry is built. The exceptional laboratory facilities of this company were described in a comprehensive way by Mr. F. M. Young at the 1934 SAE Annual Meeting. And we have shown in the earlier section of this article close-ups of the huge wind tunnel for testing large industrial heating units, as well as the small wind tunnel used for standard core sections, which are a part of this laboratory.

Two views of the activity in the factory are given in the pictorial section. One gives a general impression of a corner of the sheet metal department showing in the foreground the formation of large radiator shrouds. The other view is a set-up on a heavy duty press for restriking, the final operation, on a large radiator shell of 18 gage extra deep drawing stock having a draw of 11½ in. The job is done in only four operations—blank, draw, trim, restrike. Shells of this type are finished in chromium plate on a base of copper nickel.

Zenith-Detroit Corp.

PLANT equipment for the production of the varied line of the Zenith-Detroit Corp. naturally is



D. A. HISEY
Supt., Young Radiator Co.



E. J. BEYER
Production and Plant Mgr.
Zenith-Detroit Corp.

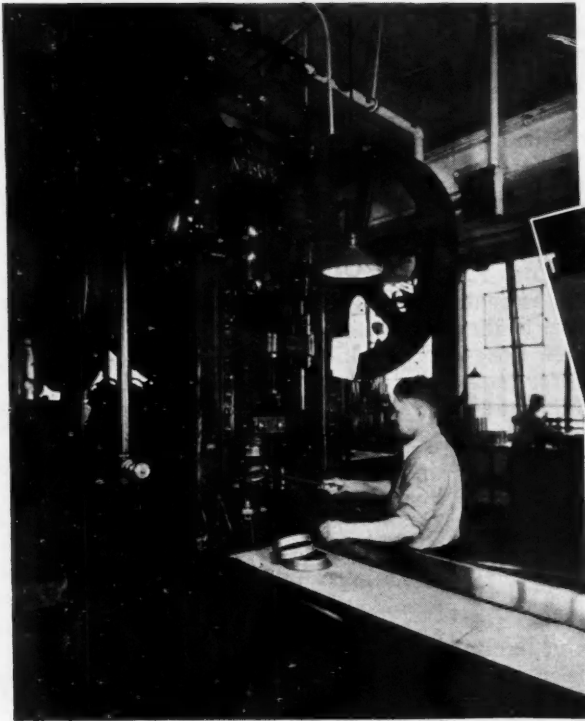
a combination of special machines and testing equipment as well as general purpose machine tools, chiefly drill presses, screw machines and presses. The factory management has followed the cemented-carbide tool development very closely and has tooled up most cast iron operations with these materials.

One of the things that impressed us particularly was the use of stainless steel for the fuel valve needle and the power jet valve, both parts being fabricated of Carpenter No. 5 Stainless. A set-up for the needle valve is shown in the pictorial section. The following descriptions of the production of these two parts may be of interest:

"Part 3201—Fuel valve needle. Cutting speed is 3600 r.p.m. We use a coolant consisting of 10 per cent Super Cool Oil and 90 per cent paraffin oil. The first operation is cut off and forms the small diameter, on a No. 00 high-speed Brown & Sharpe automatic. The second operation is the finishing of the point which is done on a special lathe with tungsten carbide tipped tools, with the same speeds and coolant as above. These parts are given 100 per cent inspection under microscopes to detect any imperfect points.

"On the power jet valve, D8078, we also use a cutting speed of 3600 r.p.m. The Coolant is 10 per cent Super Cool Oil and 90 per cent paraffin oil. The first operation is forming the head and undercutting for grinding, rough and finish turns on the shank and cut-off. This is done on a No. 00 High Speed Brown & Sharpe automatic. The second operation is the centerless grinding of the body and valve seat. This is done on a commercial centerless grinder made in Cleveland."

PARTS PRODUCTION



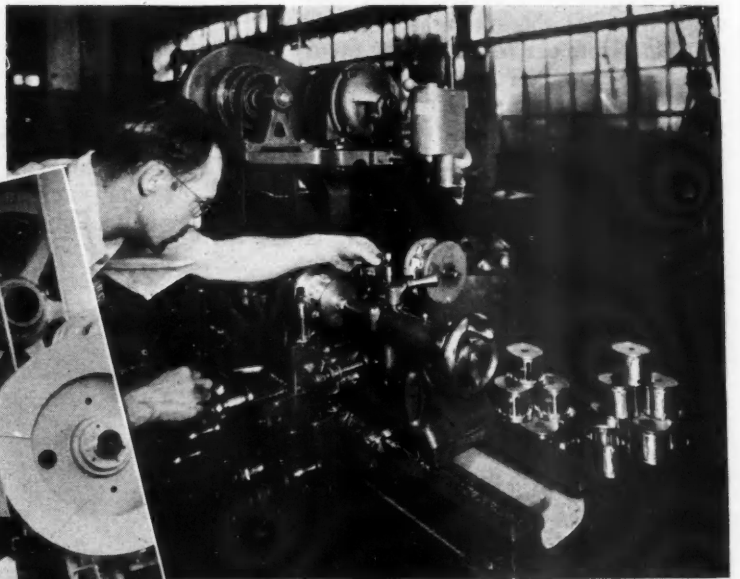
Large Toledo press drawing drum type oil filter shells at Handy Governor Corp. These shells, 6 in. in diameter and 2 in. deep, are drawn of 18 gage steel strip in one operation



White walls and ceilings together with cream colored treatment of machine tools are a feature of the Cleveland Graphite Bronze Co.'s plant. Here is a close-up of two presses showing the safety device and also bringing out the detail of the new self-contained lubricating system built into each machine. These self-feeding cups (in black) are responsible for the cleanliness of the equipment.



Another big row of cream colored presses at Cleveland Graphite Bronze just to show how this scheme has been carried through the whole plant.



Turning, threading and winding the filter element of the Handy Self-Kleen Oilfilter on a special South Bend lathe set-up. Outside diameter of the slotted brass cage is turned and threaded 96 threads to the inch. Tinned alloy steel wire, 0.008 in. diameter is wound in groove.

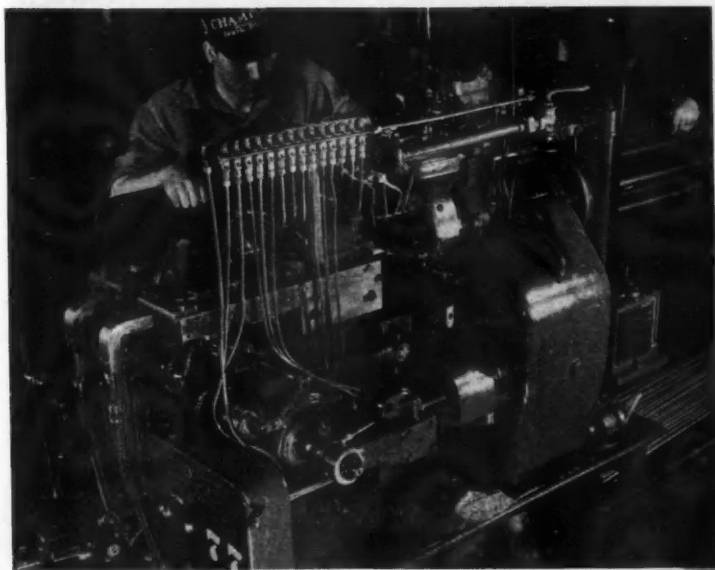
TOLD IN PICTURES



View in screw machine department of The National Acme Co. contract shop. In foreground is one of the newest model R Gridley automatics, 3½ in. size, working on the large diameter knee-action parts



New draw bench for cold drawing steel recently installed by Champion Spark Plug Co. It has a capacity of 100 tons a day



One of battery of Davenport automatics recently installed by Champion Spark Plug Co. These machines are tooled up for producing knurled terminal nuts which are turned out at the rate of 130 per minute



An eight-station Kingsbury automatic indexing machine with six automatic drilling units and one tapping unit installed by Spicer for finishing the forging used on the new tubular shock absorber

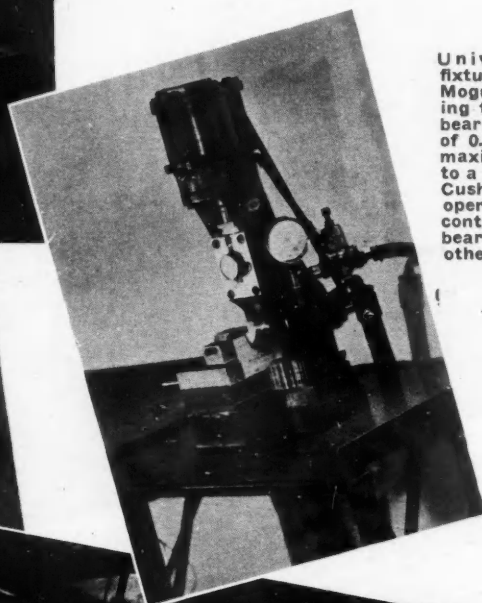
PARTS PRODUCTION



Corner of sheet metal department of the Young Radiator Co.



Breaking sharp edges in slots of aircraft valve guides and tappets with air turbine spindle running at 35,000 r.p.m. One of many special precision set-ups at Ex-Cell-O Aircraft & Tool Corp.



Universal inspection fixture used at Federal-Mogul Corp. for checking the height of split bearings to tolerance of 0.00025 in. It has a maximum capacity up to a 6 in. O.D. bearing. Cushioned air cylinder operates the ram which contacts one side of bearing, forcing the other side against a fixed stop.



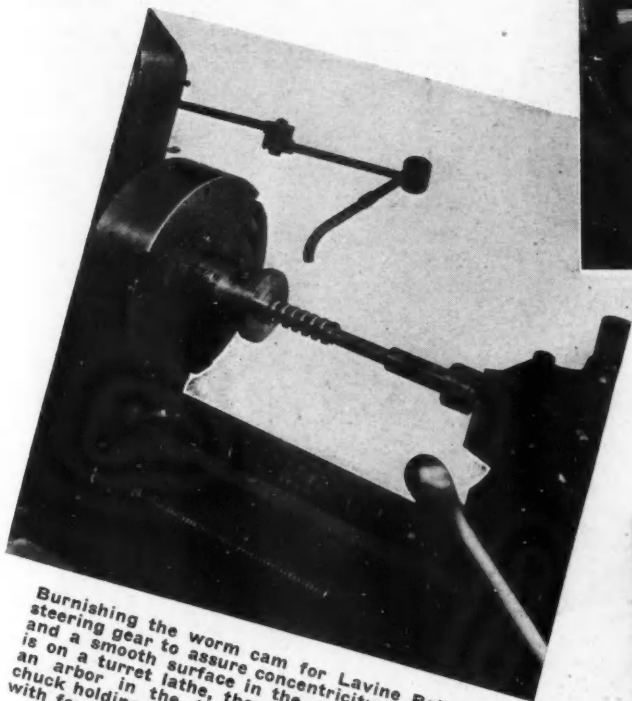
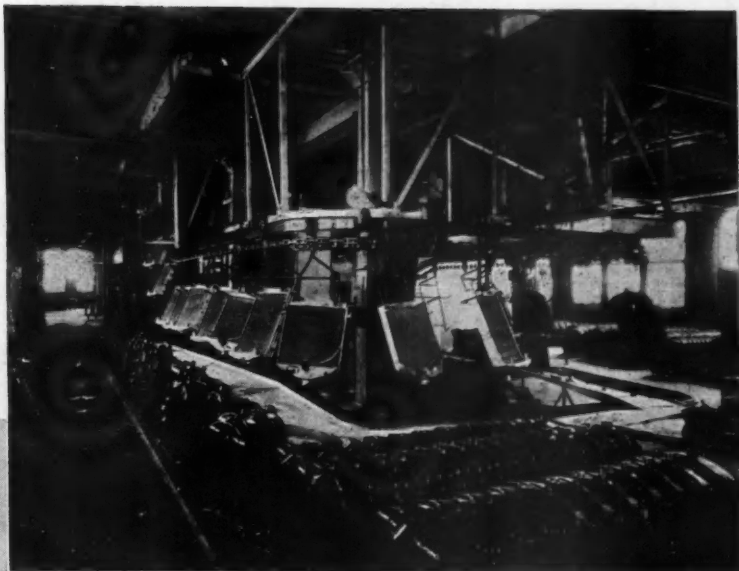
Restrike operation on large radiator shell of 11½ in. draw at Young Radiator Co.



Thompson Products finishes inserted valve seat rings on the new Heald internal centerless grinder. The cycle is entirely automatic, the machine being hopper fed as shown. The operation is finishing the inside diameter of the ring

TOLD IN PICTURES

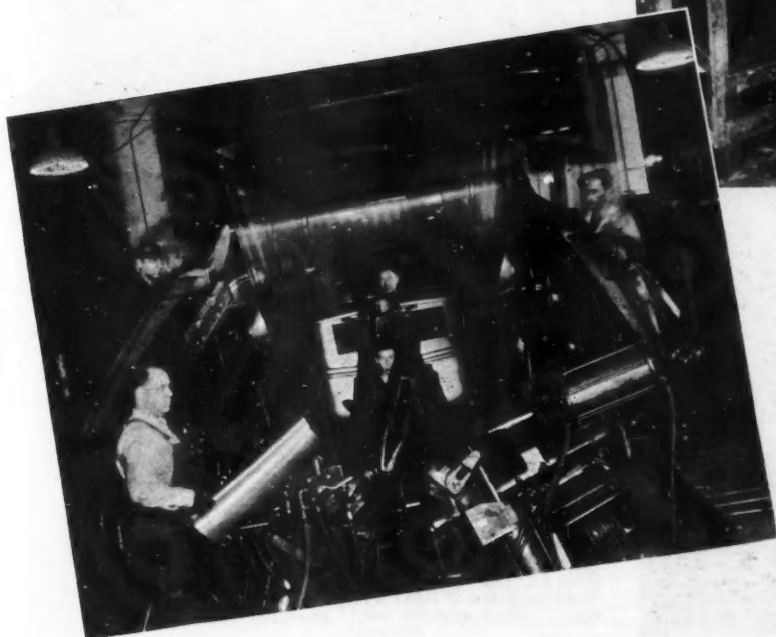
Special conveyor line for Ford radiators winding its course from the upper floor at McCord Radiator Co. plant.



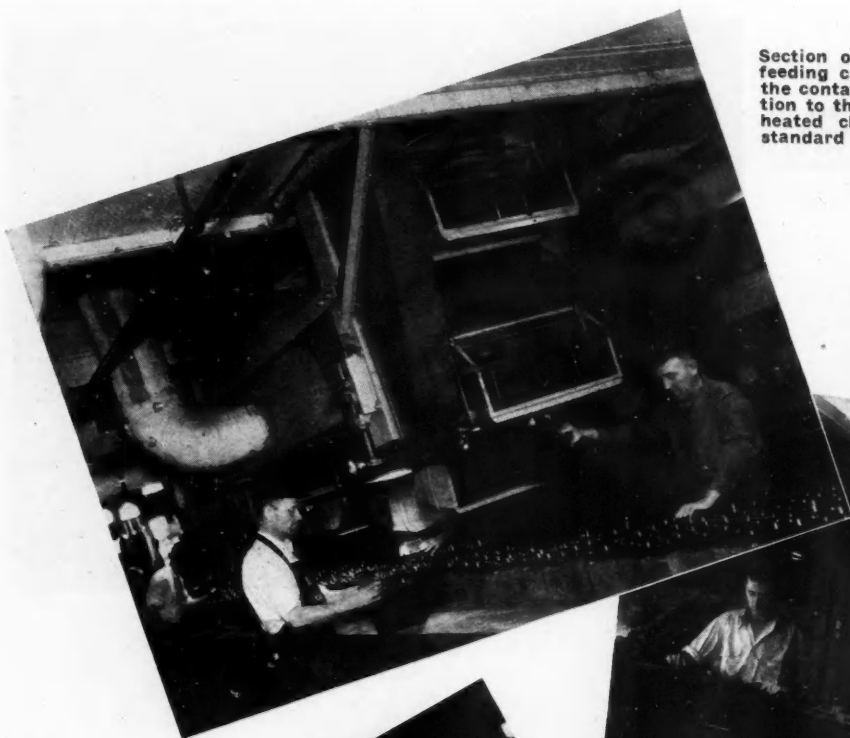
Burnishing the worm cam for Lavine Ball-Drive steering gear to assure concentricity of the worm and a smooth surface in the groove. The set-up is on a turret lathe, the worm being mounted on an arbor in the turret and advanced into the chuck holding a special fixture. The latter is fitted with four hardened balls of the same size as those used in the gear.



Six-point flash welder used by E. G. Budd Detroit plant for the complete assembly of sedan body in one setting. (Above) shows machine at rest. (Left) shows the machine with its crew of five operators about to set the individual stampings in place for welding.

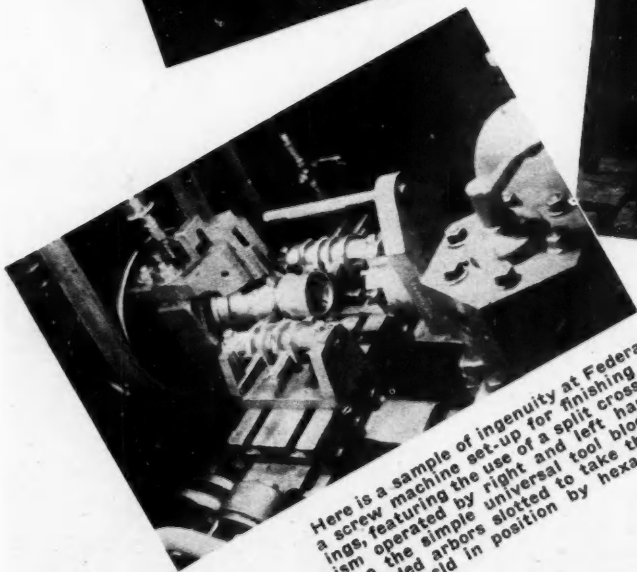


PARTS PRODUCTION



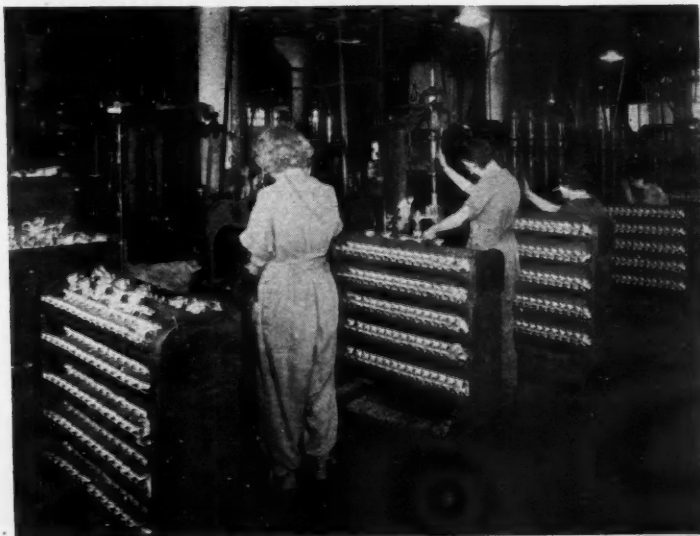
Section of a vertical merry-go-round conveyor feeding cases to the Willard assembly line. As the containers move from the upper loading station to the assembly line they go through an air heated chamber which brings them up to a standard temperature regardless of outside conditions

Unloading battery containers from freight cars and transfer to the factory conveyor system at the Willard Storage Battery plant. The unloader is a portable, independently driven unit which can be moved anywhere along the loading dock. It carries the cases to an overhead belt conveyor which delivers them to the inspection station



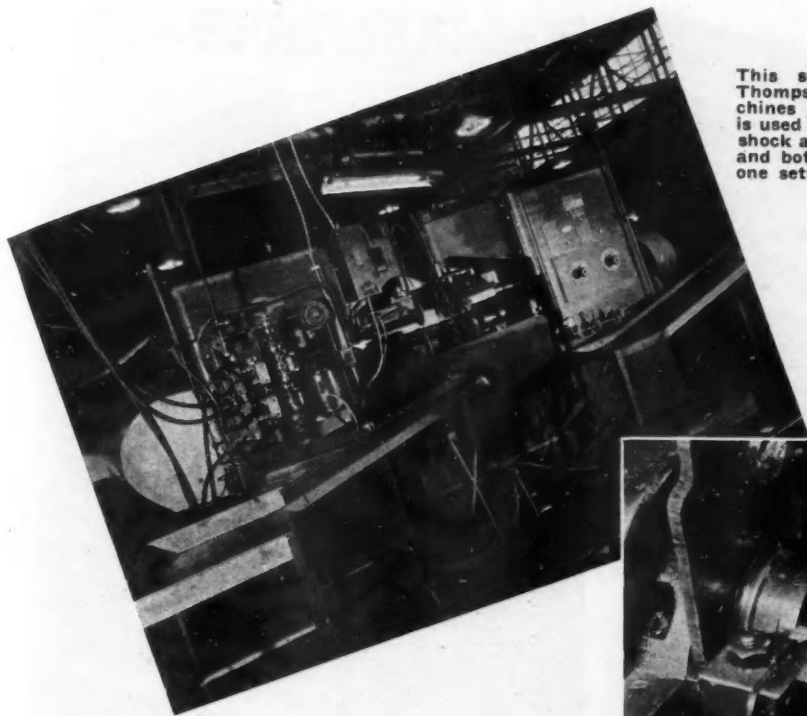
Here is a sample of ingenuity at Federal-Mogul. It's a screw machine set-up for finishing flanged bearings, featuring the use of a split cross-slide mechanism, operated by right and left hand screws. Note also the simple universal tool blocks consisting of threaded arbors slotted to take the tools which are held in position by hexagonal nuts

(Below): Production flow meters giving carburetors the final test at Tillotson. These instruments check at two critical points—idling and full throttle.



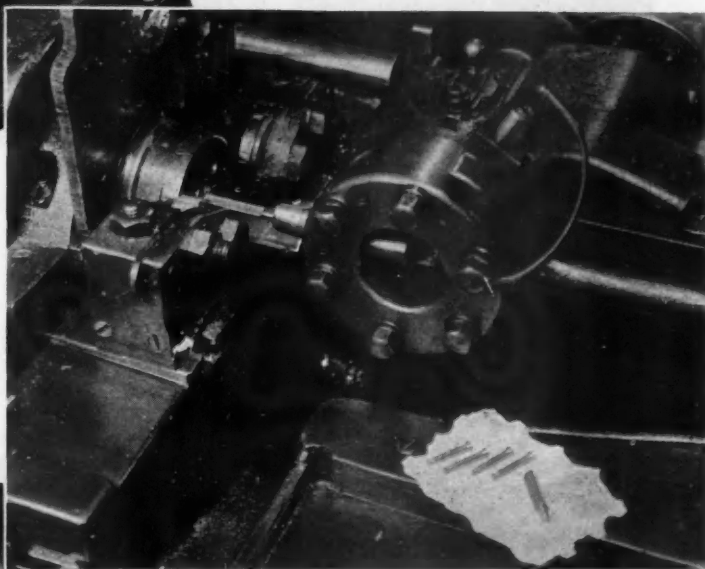
(Left): One of the production drill press lines at The Tillotson Mfg. Co. The equipment consists of light and medium duty drills with single-spindle and multiple spindle set-ups.

TOLD IN PICTURES

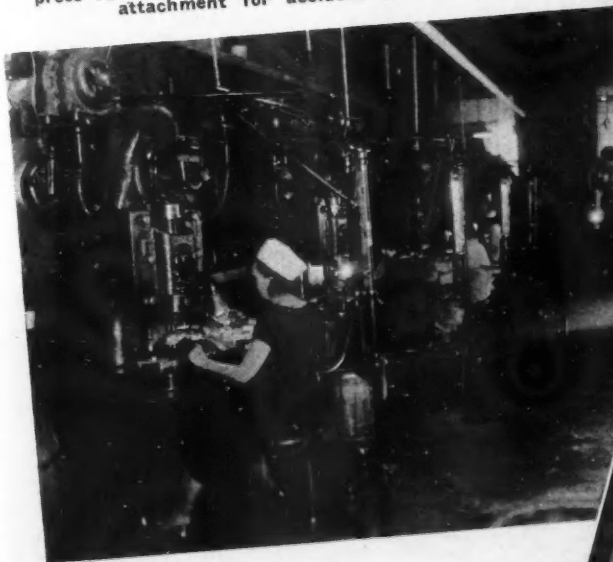


This special double-end seam welder by Thompson-Gibb is one of the group of machines just installed by Spicer Mfg. Co. It is used in the production of the Spicer tubular shock absorber, joining the forgings at the top and bottom to the tube by seam welding in one setting. Production is about 3000 pieces a day

Turning and forming the Zenith power jet valve, of Carpenter No. 5 stainless, on a No. 00 high speed B & S automatic. Cutting speed is 3600 r.p.m.

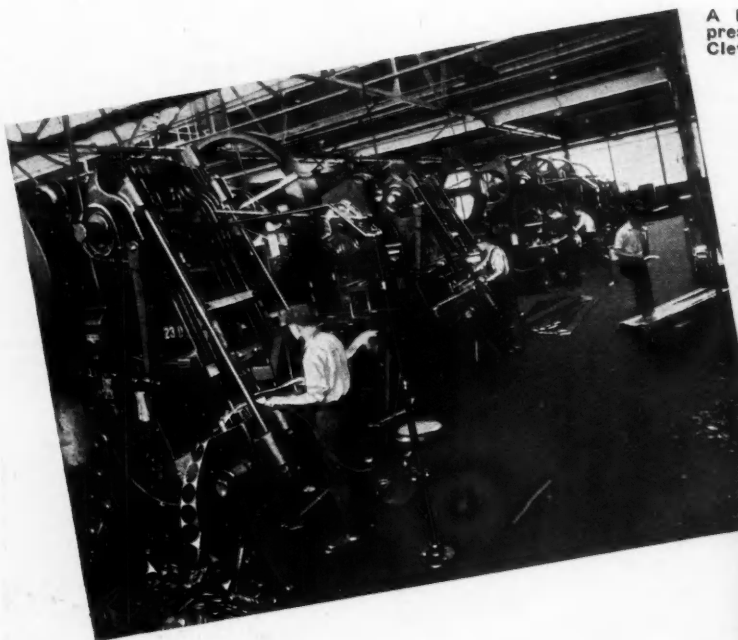


View in one section of Ackerman-Blaesser-Fezzey press room. Note the installation of Positive Safety attachment for accident prevention

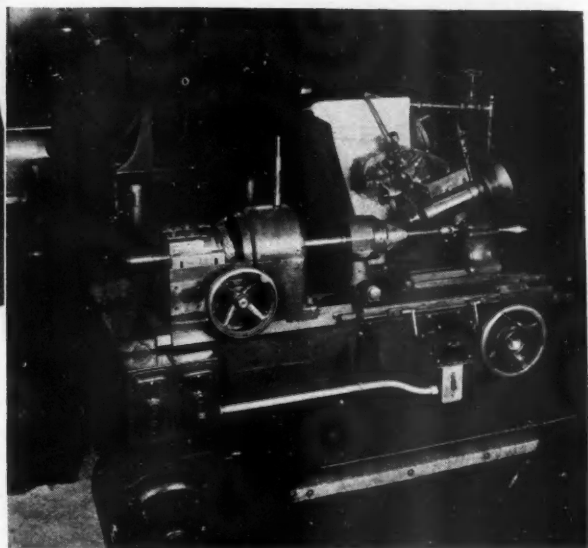


Production flow meter giving carburetors the final test at the Zenith-Detroit plant. Air velocity is variably adjusted by manipulating the venturi control valves on the board at the left

PARTS PRODUCTION



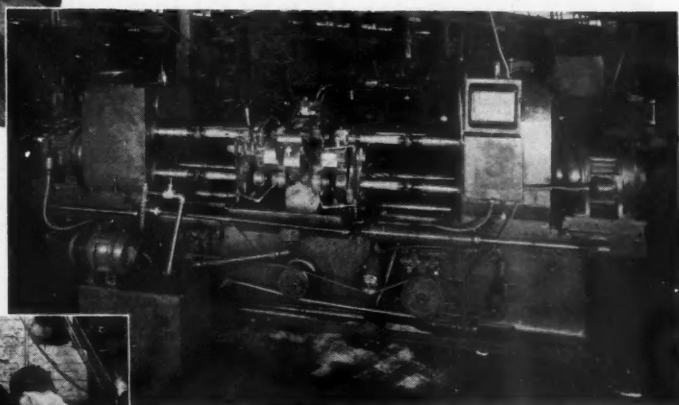
A battery of heavy-duty Bliss inclinable presses working on Easy-On caps at the Cleveland plant of the Eaton Detroit Metal Co.



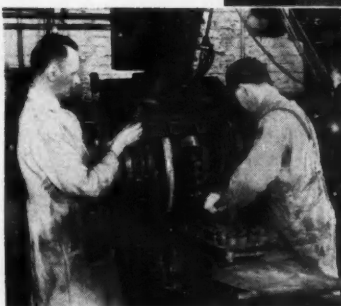
Ex-Cell-O has special set-up for grinding steel worms for quiet operation applications.



Another view in the Electric Auto-Lite plant. In the center is the start of the generator assembly line; at the right, standard and special equipment for boring pole pieces; at the left, start of motor assembly line.



Double-end Baker drilling machine installed by Spicer for drilling, boring, and reaming cross holes in universal joint yokes. This illustrates the unique fixture design practice followed in this plant. The machine simply supplies the drive and feed through universally-jointed bars piloted by the self-contained fixture.



Double-end grinding machine used by Cuyahoga Spring Co. to finish springs accurately to length.

TOLD IN PICTURES



Federal-Mogul uses a special universal chuck for holding marine bronze propellers while machining the taper hole. The same fixture takes the gamut of propellers from 8 to 26 in. in diameter, any blade pitch up to 30 deg., either right or left hand

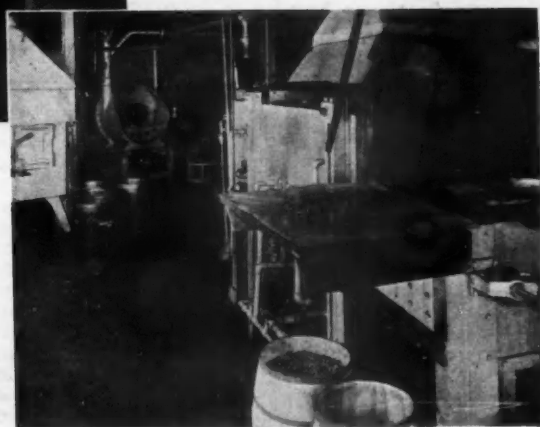


(Above): Glimpse of polishing department of Eaton Detroit Metal Co.



(Center): One of group of ignition testing machines at Holley Carburetor Co. used for production testing of complete units

(Below): Corner of heat treating department at Cuyahoga Spring Co.



(Left): Cooper-Hewitt daylighting features this department of The Electric Auto-Lite Co. It is completely conveyorized to facilitate handling of work. The section shown here is devoted to machining of the commutator end head

THE INDUSTRY'S FIRST

THE accompanying tabular material represents, so far as we know, the first comprehensive study of the variation in the fits between certain mating parts among the power plants and chassis units of American passenger cars. It is the source from which was prepared P. M. Heldt's article, "Tolerances in Automotive Production," published in last week's issue of *Automotive Industries*.

This analysis of current practice has been developed from a personal survey by *Automotive Industries* which has been made possible through the generous cooperation of passenger car manufacturers.

The need for such data has been felt for a long time and in fact an approach to standardization in this direction has been the objective of certain engineering societies, with but scant success. No attempt has been made in this study to read trends or standard practice into the data given here, since there are too many individual variations in design
(Turn to page 519, please)

This analysis of current practice has been developed by Automotive Industries through the cooperation of passenger car makers

CYLINDER BORE TOLERANCES

Dimensional data for cylinder bores have been omitted but an analysis of the specified limits show that:

- 30 engines have a total tolerance of .0020
- 6 engines have a total tolerance of .0015
- 5 engines have a total tolerance of .0010

A similar breakdown of the limits of maximum piston skirt diameters indicate that:

- 3 engines have a total tolerance of .0042
- 1 engine has a total tolerance of .0032
- 19 engines have a total tolerance of .0021
- 2 engines have a total tolerance of .0020
- 3 engines have a total tolerance of .0015
- 2 engines have a total tolerance of .0010
- 3 engines have a total tolerance of .0005

Max. Piston Clearance = Max. Bore Diameter — Min. Skirt Diameter Average
Value = 0.0037 in.

Min. Piston Clearance = Min. Bore Diameter — Max. Skirt Diameter Average
Value = — 0.0001 in.

All pistons are selectively fitted and the aim evidently is to make the clearance equal to the mean of the max. and min. possible values. This would give a clearance of 0.0018 in. on the diameter and 0.0009 in. on the radius.

Main Bearing, Total Tolerance

(23 models analyzed)

On Journal Diameter

- 3 models002
- 14 models001
- 6 models0005

On Crankcase Bore

- 1 model005
- 3 models002
- 1 model0015
- 7 models001
- 8 models0005
- 3 models, data not available.

On Bushings-I. D.

- 1 model002
- 10 models001
- 4 models0005
- 1 model00025
- 5 models, tolerance specified by wall thickness of bearing.
- 2 models, data not available.

On Bushing-O. D.

- 1 model0035
- 1 model0015
- 1 model001
- 1 model0007
- 6 models0005
- 4 models, tolerance specified by wall thickness of bearing.
- 2 models, blue to ring tolerance.
- 7 models, data not available.

MAIN BEARINGS

JOURNAL		CRANKCASE		BUSHING			
Diameter Limits		Bore Limits		I.D. Limits		O.D. Limits	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1.998	1.999	2.060	2.065	2.000	2.001	.....	.....
2.249	2.250	2.4065	2.4070	W.T.	W.T.	.....	.....
2.2495	2.2500	2.406	2.407	2.2505	2.2525	2.4075	2.4080
2.279	2.280	2.6535	2.6550	2.2805	2.2815	2.653	2.6565
2.341	2.342	3.000	3.002	2.3425	2.3435	2.717	2.7185
2.3435	2.3440	2.499	2.500	W.T.	W.T.	W.T.	W.T.
2.374	2.375	2.7500	2.7505	2.37700	2.37725	2.7500	2.7505
2.374	2.375	2.749	2.750	.....	.....	.....	.....
2.3745	2.3750	2.1820	2.1825	2.3755	2.3760	2.8125	2.8125
2.4345	2.4365	2.730	2.732	2.4375	2.4385	.....	.....
2.4345	2.4365	2.810	2.812	2.4375	2.4385	.....	.....
2.499	2.500	2.6565	2.6570	W.T.	W.T.	W.T.	W.T.
2.499	2.500	3.0615	3.0625	2.502	2.503	3.0625	3.0630
2.4995	2.5000	2.656	2.657	.....	.....	2.6570	2.6575
2.623	2.624	.....	.....	2.625	2.626	2.8755	2.8760
2.6240	2.6245	3.0620	3.0625	2.6250	2.6255	3.0625	3.0625
2.624	2.625	3.1865	3.1875	2.627	2.628	3.1875	3.1880
2.6245	2.6255	.....	.....	2.6265	2.6270	3.1145	3.1155
2.6250	2.6255	2.999	3.000	2.6275	2.6280	3.000	.....
2.6655	2.6665	.....	.....	2.6675	2.6685	.0007	Tolerance
2.6845	2.6865	3.060	3.062	2.6875	2.6885	.....	.....
2.702	2.703	2.8745	2.8750	W.T.	W.T.	W.T.	W.T.
2.749	2.750	3.2495	3.2500	W.T.	W.T.	W.T.	W.T.

W.T.—Specify by wall thickness of bearing.

TOLERANCE DATA

Crankshaft End Clearances

Min. End Clearance from 0.001 to 0.005 in.
Max. End Clearance from 0.004 to 0.010 in.
Average values of min. and max. end clearances approximate 0.003 and 0.006 in.

Front Camshaft Bearing, Total Tolerances

(27 models analyzed)

On Journal Diameter

1 model0055
14 models001
1 model0007
11 models0005

On Crankcase Bore

1 model0025
7 models002
2 models0015
17 models001

On Bushing-O. D.

3 models002
11 models001
9 models, push fit.
3 models, no bushing.
1 model, no data available.

On Bushing-I. D.

2 models003
2 models0016
2 models0015
15 models001
2 models00075
2 models0005
1 model0003
1 model, selective fit

FRONT CAMSHAFT BEARINGS

JOURNAL		CRANKCASE		BUSHING			
Diameter Limits		Bore Limits		O.D. Limits		I.D. Limits	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1.2490	1.2495	2.499	2.500	2.4985	2.4995	2.002	2.003
1.499	1.500	1.874	1.875	1.876	1.877	1.5005	1.5015
1.7965	1.7970	1.9275	1.9285	1.934	P. F.	1.7980	1.7985
1.808	1.809	1.812	1.813	None	None	1.812	1.813
1.874	1.875	2.642	2.643	2.640	2.641	1.8762	1.8778
1.934	1.935	2.065	2.066	2.068	2.069	1.9362	1.9378
1.9350	1.9355	2.0655	2.0665	P. F.	P. F.	1.93625	1.93725
1.9930	1.9935	2.1235	2.1255	2.1325	.....	1.9950	1.9955
1.9970	1.9975	2.1285	2.1295	2.132	2.134	1.9995	2.0010
1.997	1.998	2.246	2.248	2.2515	2.2525	1.995	2.005
1.9975	1.9980	2.128	2.129	P. F.	P. F.	1.99875	1.99975
1.998	1.999	2.1290	2.1300	2.1375	P. F.	2.000	2.001
1.998	1.999	2.4415	2.4425	2.4405	2.4415	1.9995	2.0005
2.0265	2.0275	2.777	2.779	2.2825	2.2835	2.0307	2.0317
2.0305	2.0315	2.288	2.290	P. F.	P. F.	2.032	2.033
2.0375	2.0380	2.1760	2.1775	2.187	P. F.	2.0315	2.0345
2.0605	2.0615	2.5615*	2.5625	2.200	P. F.	2.0625	2.0635
2.091	2.092	2.222	2.224	None	None	2.0935	2.0945
2.185	2.186	2.3165	2.3190	None	None	2.185	2.186
2.2475	2.2480	2.3775	2.3785	2.380	2.381	2.24925	2.25000
2.2425	2.2480	2.377	2.378	2.3795	2.3805	2.24925	2.25000
2.248	2.249	2.6240	2.6255	2.626	2.627	2.251	8. F.
2.2725	2.2735	2.5922	2.5942	P. F.	P. F.	2.274	2.275
2.2792	2.2802	2.5922	2.5942	P. F.	P. F.	2.2807	2.2817
2.3095	2.3100	2.4415	2.4425	2.4445	2.4465	2.3120	2.3135
2.3095	2.3100	2.441	2.442	2.4445	2.4465	2.3105	2.3135
2.3363	2.3370	2.640	2.641	2.5955	2.5965	2.3418	2.3421

S. F.—Selective Fit.

P. F.—Push Fit.

* There is a cast-iron retainer between the thin-wall bushing and the bore of the block. This retainer has an outside diameter of 2.5605-2.5615 in. and is a press fit in the block, the interference being 0.000-0.002 in. The inside diameter of this retainer is 2.1915-2.1925 in., and the bushing is a press fit in the retainer, the interference being 0.0075-0.0085 in. The outside diameter of the bushing is finished to size to a ring gage of 2.200 in. bore.

PISTON RINGS

OIL				COMPRESSION			
Groove Width Limits		Ring Width Limits		Groove Width Limits		Ring Width Limits	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
.1253	.1261	.1235	.1240	.1253	.1261	.1235	.1240
.126	.127	.1235	.1240	.1875	.1885	.1860	.1865
.1260	.1265	.1245	.1250	.0947	.0952	.0932	.0937
.156	.157	.1545	.1550	.125	.126	.1235	.1240
.156	.157	.1545	.1550	.093	.094	.0915	.0920
.156	.157	.1545	.1550	.126	.127	.1235	.1240
.1563	.1571	.1545	.1550	.0950	.0958	.0930	.0935
.1565	.1572	.1545	.1550	.1255	.1262	.1235	.1240
.1570	.1575	.1545	.1550	.1260	.1265	.1235	.1240
.187	.188	.1860	.1865	.125	.126	.1235	.1240
.1875	.1885	.1860	.1865	.1255	.1265	.1235	.1240
.1878	.1886	.1860	.1865	.0950	.0958	.0930	.0935
.188	.189	.186	.187	.1255	.1265	.123	.124
.188	.189	.1860	.1865	.126	.127	.1235	.1240

Piston Rings, Total Tolerances

(14 models analyzed)

On Oil Ring Groove Width

8 models001
3 models0008
1 model0007
2 models0005

On Oil Ring, Width

1 model001
13 models0005

On Compression Ring, Groove Width

8 models001
3 models0008
1 model0007
2 models0005

On Compression Ring, Width

1 model001
13 models0005

PISTON PINS						CONNECTING RODS—UPPER END							
O.D. Limits		Piston—Boss Bore Limits		Fitted Selectively	No. of Classification	I.D. Bushing Limits		O.D. Bushing Limits		Bore Limits		Center to Center Length	
Min.	Max.	Min.	Max.			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
.7480	.7485	.7485	.7490	Yes	5	None	None	None	None	.7485	.7495	8.998	9.002
.74965	.74990	.7496	.7499	No	None	.7496	.750	.939	.940	.937	.938	8.1825	8.1925
.7501	.7504	.7499	.7502	Yes	4	.7503	.7506	P. F.	P. F.	.798	.801	6.998	7.002
.8120	.8125	.8125	.8130	Yes	5	None	None	None	None	.8125	.8135	9.748	9.752
.8120	.8125	.8125	.8130	Yes	5	None	None	None	None	.8125	.8135	7.248	7.252
.8125	.8130	.8130	.8135	Yes	...	None	None	None	None	.8135	.8145	9.245	9.255
.8125	.8130	.8130	.8135	Yes	...	None	None	None	None	.8135	.8145	8.620	8.630
.8554	.8558	.8552	.8557	Yes	5	Split	Split	Split	Split	.9115	.9130	8.998	9.002
.8554	.8558	.8552	.8557	Yes	5	Split	Split	Split	Split	.9115	.9130	7.810	7.814
.8555	.8557	.8555	.8558	Yes	4	.8559	.8564	.9165	.....	.9115	.9130	8.998	9.002
.8591	.8593	.8590	.8593	No	None	.8592	.8596	.9185	Nom.	.913	.914	8.746	8.750
.8591	.8593	.8589	.8593	No	None	.8592	.8596	.9185	Nom.	.913	.914	8.996	9.000
.8591	.8593	.8589	.8593	No	None	.8592	.8596	.9185	Nom.	.913	.914	8.746	8.750
.8591	.8593	.8589	.8593	No	None	.8592	.8596	.9185	Nom.	.913	.914	7.9335	7.9375
.8737	.8740	P. F.	P. F.	Yes	Va.	.8745	.8748	P. F.	P. F.	.934	.935	8.4355	8.4395
.8737	.8740	P. F.	P. F.	Yes	Va.	.8745	.8748	P. F.	P. F.	.934	.935	8.248	8.256
.8737	.8740	P. F.	P. F.	Yes	Va.	.8745	.8748	P. F.	P. F.	.934	.935	9.498	9.502
.87375	.87475	1.06175B	1.06275B	Yes	4	None	None	None	None	.8745	.8755	9.0345	9.0395
.8740	.8745	.8745	.8750	Yes	5	None	None	None	None	.8745	.8755	10.998	11.002
.8741	.8745	.8742	.8746	Yes	4	None	None	None	None	.8745	.8755	8.2475	8.2525
.8741	.8745	.8742	.8745	Yes	4	None	None	None	None	.8745	.8755	7.9975	8.0025
.8742	.8744	.8742	.8745	Yes	4	.8615	.8625	.935	.....	.9295	.9305	10.498	10.502
.8742	.8744	.8742	.8745	Yes	4	.8615	.8625	.935	.....	.9295	.9305	9.248	9.252
.8745	.8748	.8748	.8753	No	None	.8750	.8755	.936	Nom.	.9305	.9315	10.870	10.880
.8748	.8750	.875	S. F.	No	None	None	None	None	None	.875	.878	9.495	9.505
.8749	.8751	.8615	.8625	No	None	.8756	.8756	Burnished		.929	.930	9.936	9.939
.8752	.8754	.87495	.87515	Yes	Va.	.8754	.8756	1.0635	1.0645	1.062	1.063	10.873	10.877
.8752	.8754	.87495	.87515	Yes	Va.	.8754	.8756	1.0635	1.0645	1.042	1.044	8.998	9.002
.9355	.9359	.9357	.9361	Yes	16	None	None	None	None	.936	.937	9.029	9.034
.9355	.9359	.9357	.9361	Yes	16	None	None	None	None	.936	.937	8.904	8.909
.9369	.9375	.9366	.9372	Yes	5	.922	.924	.9372	.9378	.993	.994	7.685	7.690
.9895	.9900	S. F.	S. F.	Yes	Va.	None	None	None	None	.990	.992	7.495	7.505
.9895	.9900	S. F.	S. F.	Yes	Va.	None	None	None	None	.990	.992	6.526	6.536

B—Bushed. P. F.—Push Fit. S. F.—Selective Fit.

VALVES

Intake—Stem Diameter Limits		Exhaust—Stem Diameter Limits		Bore—Diameter for Guides		Bushings—O.D. Limits for Guides		Valve Stem Guide—I.D. Limits			
								Intake		Exhaust	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
.306	.307	.306	.307	.624	.625	.6255	.6260	.310	.311	.310	.311
.3095	.3105	.3085	.3105	.561	.563	.5635	.5650	.3115	.3125	.3115	.3125
.310	.3105	.308	.309	.624	.625	.626	.627	.312	.313	.312	.313
.310	.311	.310	.311	.6245	.6255	.6265	.6275	.3103	.3113	.3103	.3113
.3105	.3115	.3105	.3115	1.031	1.032	1.0305	1.0310	.313	.314	.313	.314
.3392	.3397	.3392	.3397	.593	.594	.5945	.5948	.3407	.3417	.3407	.3417
.3395	.3405	.3395	.3405	.5932	.5942	.5947	.5948	.3425	.3435	.3440	.3450
.340	.341	.340	.341	.6540	.6555	.6565	.6575	.342	.343	.344	.345
.340	.341	.337	.338	.7495	.7505	.7500	.7505	.3425	.3430	.3425	.3430
.3405	.3410	.3405	.3410	.6865	.6875	.688	.689	.342	.343	.342	.343
.3405	.3415	.3405	.3415	.686	.687	.6875	.6880	.342	.343	.342	.343
.3407	.3417	.3397	.3407	.561	.563	.5635	.5650	.3427	.3437	.3427	.3437
.3407	.3417	.3403	.3411	.5937	.5947	.5947	.5957	.3432	.3442	.3432	.3442
.341	.342	.341	.342	.7195	.7205	.7207	.7217	.343	.344	.343	.344
.341	.342	.341	.342	.6245	.6255	.626	.627	.343	.344	.343	.344
.3415	.3425	.3405	.3415	.656	.657	.6575	.6580	.34375	.34475	.34375	.34475
.3420	.3425	.3420	.3425	.6242	.6253	.626	.627	.3435	.3445	.344	.345
.3715	.3725	.3711	.3719	.6245	.6255	.6255	.6265	.374	.375	.374	.375
.3715	.3725	.3705	.3715	.624	.625	.6255	.6260	.3740	.3750	.3740	.3750
.3725	.3735	.3715	.3725	.6245	.6255	.626	.627	.3740	.3750	.3740	.3750

Piston Pins, Connecting Rods (Upper End),
Total Tolerances
(33 models analyzed)

On Piston Pins, O. D.

1 model	.001
1 model	.0006
8 models	.0005
6 models	.0004
5 models	.0003
1 model	.00025
11 models	.0002

On Piston Pin Bore

3 models	.001
1 model	.0006
8 models	.0005
6 models	.0004
7 models	.0003
2 models	.0002
3 models, push fit.	
3 models, selective fit.	

On Connecting Rod Upper Bushing, O. D.

3 models	.001
1 model	.0006
14 models, no upper bushings.	
2 models, split bushings.	
4 models, push fit.	
1 model, burnished.	
5 models, nominal fit.	
3 models, had insufficient data.	

On Connecting Rod Upper Bushing, I. D.

1 model	.002
2 models	.001
2 models	.0005
5 models	.0004
4 models	.0003
2 models	.0002
14 models, no upper bushing.	
2 models, split bushings.	
1 model, data not available.	

On Connecting Rod Upper End

Bore Limits

2 models	.003
3 models	.002
3 models	.0015
25 models	.001

On Connecting Rod, Center to Center Length

7 models	.01
1 model	.008
5 models	.005
19 models	.004
1 model	.003

FINISHED WEIGHT
TOLERANCES

Piston	Piston Pin	Connecting Rod
Sel.	None	Sel.
± 1/16 oz.	None	*
± 1/8 oz.	None	Sel.
± 1 gr.	None	Sel.
Sel.	None	± 1 oz.
Sel.	None	± 1 gr.
± 1/8 oz.	None	Sel.
± 1/4 oz.	None	± 1/8 oz.
Sel.	None	± 1/16 oz.
± 1/8 oz.	None	± 1/8 oz.

* Machined to exact weight.

Connecting Rod (Lower End),
Total Tolerances

(28 models analyzed)

On Crankshaft Crankpin Diameter

4 models	.002
22 models	.001
2 models	.0005

On Bore, if Liners are used (Otherwise I. D. of Bearing)

1 model	.0012
8 models	.001

2 models	.0006
14 models	.0005
2 models	.0004
1 model	.0003

On Wall Thickness of Bearing

1 model	.0015
1 model	.001
6 models	.00025
20 models, Babbitted.	

Valve, Total Tolerances
(20 models analyzed)

On Stem Diameter-Intake

16 models	.001
4 models	.0005

On Stem Diameter-Exhaust

2 models	.002
13 models	.001
2 models	.0008
3 models	.0005

On Bore Diameter for Guides

2 models	.002
1 model	.0015
1 model	.0011
16 models	.001

On Bushing-O. D. for Guides

2 models	.0015
10 models	.001
6 models	.0005
1 model	.0003
1 model	.0001

On Intake-I. D. for Guides

1 model	.002
18 models	.001
1 model	.0005

On Exhaust-I. D. for Guides

1 model	.004
18 models	.001
1 model	.0005

CONNECTING ROD—Lower End

Crankshaft Crankpin Diameter Limits		Bore, if Liners are used (Otherwise I.D. of Bearing)		Wall Thickness of Bearing	
Min.	Max.	Min.	Max.	Min.	Max.
1.873	1.874	1.9795*	1.9800*	Babbitted Rod	
1.87425	1.87525	2.0005	2.0010	.06200	.06225
1.936	1.937	1.9363	1.9367	Babbitted Rod	
1.9365	1.9375	2.0425	2.0430	.05200	.05225
1.997	1.999	1.9995	2.0005	Babbitted Rod	
1.998	1.999	2.2195	2.2200	.11425	.11450
1.998	1.999	1.9995	2.000	Babbitted Rod	
2.0615	2.0625	2.1675	2.1680	.05200	.05225
2.06175	2.06275	2.06325	2.06375	Babbitted Rod	
2.1225	2.1245	2.125	2.126	Babbitted Rod	
2.123	2.124	2.1245	2.1250	Babbitted Rod	
2.124	2.125	2.1265	2.1270	Babbitted Rod	
2.124	2.125	2.2300	2.2305	.05200	.05225
2.124	2.125	2.1260	2.1266	Babbitted Rod	
2.124	2.125	2.2321*	2.2324*	Babbitted Rod	
2.124	2.125	2.1260	2.1265	Babbitted Rod	
2.184	2.186	2.1865	2.1875	Babbitted Rod	
2.1865	2.1875	2.2810	2.2815	.04600	.04625
2.248	2.249	2.2490	2.2495	.1055	.1065
2.248	2.249	2.3545*	2.3550*	Babbitted Rod	
2.249	2.250	2.2510	2.2516	Babbitted Rod	
2.249	2.250	2.2510	2.2515	Babbitted Rod	
2.3715	2.3735	2.374	2.375	Babbitted Rod	
2.374	2.375	2.4820*	2.4824*	Babbitted Rod	
2.3745	2.3750	2.356	2.357	Babbitted Rod	
2.4995	2.5000	2.5025	2.5035	Babbitted Rod	
2.4995	2.5005	2.5024	2.5036	Babbitted Rod	
2.5000	2.5005	2.6730	2.6735	.1715	.1730

* Bore of "babbitted rod" before babbitt is spun in.

TRANSMISSION

Spline Shaft —O.D. of Splines		Sliding Gear, I.D. Limits		Reverse Gear Shaft, O.D. Limits		Reverse Gear Bushing, I.D. Limits	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
.984	.9845	.985	.986	.6795	.680	.6825	.6846
1.150	1.162	1.170	1.175	.8737	.8747	.8765	.8775
1.285	1.295	1.303	1.310	.8737	.8747	.8765	.8775
1.3735	1.3740	1.374	1.375	.7495	.7500	None	None
1.3735	1.3740	1.374	1.375	.7495	.7500	.753	.754
1.3735	1.3740	1.374	1.375	.7495	.7500	.751	.752
1.624	1.625	1.426*	1.430	.7570	.7575	.758	.759
1.6255	1.6260	1.426*	1.430	.923	.924	.927	.928
1.6255	1.6260	1.426*	1.430	.757	.7575	.758	.759
1.748	1.749	1.749	1.750	.7495	.7500	.753	.754
1.748	1.749	1.749	1.750	.98725	.98775	.992	.993
1.748	1.749	1.749	1.750	.7495	.7500	.751	.752
1.7485	1.7490	1.749	1.750	.7495	.7500	.751	.752
1.800	1.801	1.801	1.802	.8745	.8752	.8785	.8795
1.8435	1.8440	1.873†	1.875	.9350	.9355	.937	.938
1.958	1.962	2.195†	2.200	.9367	.9372	.938	.939
1.958	1.962	Inv.	Inv.	.8745	.8750	.877	.878
2.0005	2.0010	1.762*	1.766	.923	.924	.927	.928
2.134	2.140	2.165†	2.170	.859	.860	.862	.863
2.166	2.172	2.195†	2.200	.874	.875	.877	.878
Inv.	Inv.	Inv.	Inv.	.859	.860	.863	.864
Sel.	Sel.	1.6225	1.6230	.8745	.8755	.8765	.8775

* At top of splines in gear.

† Not a guiding surface.

Inv.—Involute splines.

Sel.—Selective

The data appearing in pages 514-519, inclusive, formed the basis for the article "Tolerances in Automotive Production," by P. M. Heldt, which appeared in the October 20th issue of Automotive Industries.

Transmission, Total
Tolerances

(22 models analyzed)

On Spline Shaft, O. D. of
Splines

1 model	.012
1 model	.01
2 models	.006
2 models	.004
5 models	.001
9 models	.0005
1 model, involute splines.	
1 model, selective fit.	

On Sliding Gear, I. D.

1 model	.007
4 models	.005
4 models	.004
1 model	.002
9 models	.001
1 model	.0005
2 models, involute splines.	

On Reverse Gear Shaft, O. D.

8 models	.001
1 model	.0007
13 models	.0005

On Reverse Gear Bushing, I. D.

1 model	.0021
20 models	.001
1 model, no bushing.	

KING PIN

Diameter Limits		Upper Bushing I.D. Limits		Lower Bushing I.D. Limits		Knuckle Bore Limits		Upper Bushing O.D. Limits		Lower Bushing O.D. Limits	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
.733	.734	.7345	.7355	.7345	.7355	.734	.735*	.8535	.8555	.8535	.8555
.749	.7495	.7505	.752	.752	.753	....	....	1.126	1.127	.877	.878
.7495	.7500	.7505	.7520	.7505	.7520	.750	.751*	.8755	P. F.	.8755	P. F.
.7950	.7955	.7960	.7975	.7960	.7975	.9195	.9210*	.8590	.8615	.8590	.8615
.8017	.8022	.8032	.8042	.8032	.8042	.9275	....	Sel.	Sel.	Sel.	Sel.
.802	.803	.804	.805	.804	.805	.803	.804*	.9290	.9295	.9290	.9295
.8097	.8102	.8112	.8122	.8112	.8122	.93675	.93800	Sel.	Sel.	Sel.	Sel.
.8100	.8105	.811	.812	.811	.812	.936	.937	.9385	.9390	.9385	.9390
.8115	.8125	.8130	.8135	.8130	.8135	.9365	.9385	.941	P. F.	.941	P. F.
.861	.862	.8625	.8635	.8625	.8635	.9855	.9885	.9885	.9915	.9885	.9915
.861	.862	.8625	.8635	.8625	.8635	.9875	.9885	.9905	.9915	.8625	.8635
.861	.862	.8625	.8635	.8625	.8635	.9875	.9885	P. F.	P. F.	P. F.	P. F.
.8660	.8665	R. B.	R. B.	R. B.	R. B.	.8665	.8675*	R. B.	R. B.	R. B.	R. B.
.8735	.8740	.8745	.8760	.8745	.8760	.9985	1.0005	1.0035	Nom.	1.0035	Nom.
.874	.875	.8755	.8765	.8755	.8765	.993	.996	.999	1.003	.999	1.003
.9360	.9365	.9370	.9385	.9370	.9385	1.0610	1.0630	1.066	Nom.	1.066	Nom.
.9825	.9835	.9845	.9855	.9845	.9855	.984	.985	1.111	1.115	1.111	1.115
.9977	.9982	.9987	.9997	.9987	.9997	1.1245	1.1255	Burnished	Burnished	Burnished	Burnished
.999	1.000	1.0005	1.0015	1.0005	1.0015	1.117	1.120	1.123	1.127	1.123	1.127
.9990	.9995	1.0005	1.0015	1.0005	1.0015	1.117	1.120	1.123	....	1.123	....
1.1235	1.1240	1.1245	1.1260	1.1245	1.1260	1.2485	1.2505	1.2535	Nom.	1.2535	Nom.

P. F.—Push Fit.

R. B.—Roller Bearing.

Sel.—Selective.

* Bore in Axle End.

BACKLASH

Camshaft Valve Timing Drive		Rear Axle Gear and Pinion		Rear Axle Differential Pinion and Gear	
Min.	Max.	Min.	Max.	Min.	Max.
Chain	Chain	.003	.005	....	....
Chain	Chain	.006	.010	.000	.008
.0005	.0015	.006	.010	.000	.008
Chain	Chain	.004	.008	.000	.005
.000	.003	.005	.007	.006	.012
Chain	Chain	.006	.010	.007	.015
Chain	Chain	.006	.008	.005	.010
Chain	Chain	.004	.012	.000	.008
1/4 inch slack	1/4 inch slack	.003	.005	.000	.006
Chain	Chain	.001	.003	.000	.000
Chain	Chain	.002	.005	.002	.006
.000	.010	.003	.007	.002	.006
.000	.003	.002	.005	....	....

King Pin, Total Tolerances

(21 models analyzed)

On King Pin, Diameter	
9 models	.001
12 models	.0005
On Upper Bushing, I. D.	
6 models	.0015
13 models	.001
1 model	.0005
1 model, roller bearing.	
On Lower Bushing, I. D.	
5 models	.0015
14 models	.001
1 model	.0005
1 model, roller bearing.	
On Forging Bore	
4 models	.003
4 models	.002
1 model	.0015
1 model	.00125
9 models	.001
2 models, data incomplete.	
On Upper Bushing, O. D.	
3 models	.004
1 model	.003
1 model	.0025
1 model	.002
1 model	.001
2 models	.0005
1 model, roller bearing.	
3 models, push fit.	
2 models, selective fit.	
3 models, nominal fit.	
1 model, burnished.	
1 model, data incomplete.	
On Lower Bushing, O. D.	
3 models	.004
1 model	.003
1 model	.0025
1 model	.002
2 models	.001
2 models	.0005
3 models, nominal fit.	
2 models, selective fit.	
3 models, push fit.	
1 model, roller bearing.	
1 model, burnished.	
1 model, data incomplete.	

First Tolerance Data

(Continued from page 514)

features and production practice to permit of generalization. Nevertheless there is much food for reflection in the wide differences that are found to exist in the fits of similar mating parts.

In view of the confidential nature of the information, no reference is made to specific makes or even to engine sizes. What we have done is to segregate all statistics into logical groups such as piston rings, main nearings, connecting rods, etc., and then set up tables with these generic headings.

In setting up each table, size has been used as a basis, and all values have been so arranged as to produce an ascending scale in each instance starting with the smallest and going to the largest. Where identical fits and clearances have been found, only one set of figures is given, and this will account for the fact that some tables have fewer items than others, although the same number of makes and models have been considered throughout.

Under each heading for each group of mating parts, a certain element was chosen arbitrarily as the base from which the fits and clearances are calculated. Thus the diameter of the journal was taken as the base for all main bearing fits; the diameter of the king pin, for that element; the spline shaft as the base for transmission gear fits, etc. This base is made the first column in each table, reading down. Reading across the table from left to right, each line comprises the mating elements of a particular engine or chassis unit, thus giving the complete detail of

FLYWHEEL AND STARTER GEAR

Flywheel O.D. Limits at Ring Gear		Starter Ring Gear I.D. Limits—Cold	
Min.	Max.	Min.	Max.
11.807	11.811	11.787	11.791
12.120	12.124	12.100	12.104
12.210	12.214	12.184	12.190
12.325	12.329	12.309	12.315
12.375	12.380	12.364	12.369
12.435	12.439	12.415	12.429
12.628	12.632	12.608	12.614
12.724	12.728	12.705	12.712
12.918	12.924	12.918	12.922
12.947	12.950	12.926	12.928
12.995	12.999	12.975	12.979
12.998	13.002	12.975	12.982
13.077	13.081	13.056	13.062
13.301	13.304	13.293	13.297
13.560	13.564	13.528	13.532
13.560	13.564	13.538	13.542
13.572	13.576	13.5575	13.5645
13.580	13.584	13.560	13.564
13.701	13.704	13.693	13.697
13.935	13.950	Int.	Int.
14.224	14.227	14.216	14.220
14.6285	14.6295	14.625	14.635

Int—Integral (with Flywheel)

Flywheel and Starter Ring Gear, Total Tolerances

(22 models analyzed)

On Flywheel O. D. at Ring Gear Seat	
1 model	.01
1 model	.006
1 model	.005
14 models	.004
4 models	.003
1 model	.001
On Starter Ring Gear, I. D. Cold	
1 model	.014
1 model	.01
2 models	.007
4 models	.006
2 models	.005
9 models	.004
1 model	.003
1 model	.002
1 model, integral with fly-wheel.	

individual practice which can then be compared with the practice of other car builders.

Finally, the individual tables were analyzed as to the range of total tolerance from make to make. The function of this digest is to give a quick picture of the spread in practice—to show the difference between the extremes of high and low—as well as to detect whatever degree of uniformity may exist.

1934

PRODUCTION

New Turret Lathe Easy to Operate

A new one-inch bar capacity turret lathe capable of 1480 r.p.m., with an improved bar feed mechanism is announced by The Warner & Swasey Company, Cleveland, Ohio. It is equipped with a six-speed all-gear head with speed ranges from 67 to 740 r.p.m. up to from 134 to 1480 r.p.m. A two-speed motor makes 12 speeds possible with a range from 67 to 1480 r.p.m.

The new type automatic circumference binder ring, which permits the clamping and indexing of the hexagon turret by a rotation of the turnstile, is incorporated in this turret lathe. This is an important factor in high-speed work where the reduction of the handling time becomes an item.

The high speeds and the ease of operation make it an efficient machine tool for use on very small work, as well as for second-operation work in automatic bar departments. Cemented tungsten carbide tools may be used on cast iron, steel, non-ferrous metals or non-metallic materials.

A new combination friction finger and ratchet bar feed has been designed which speeds up the operation and provides for the safety of the operator. Bars up to $\frac{1}{2}$ -inch diameter are advanced with a friction finger lying immediately behind the collet inside the spindle and enclosed throughout their length. Bars above $\frac{1}{2}$ -inch diameter are fully enclosed at the rear end, being exposed only for the length of the ratchet feed stroke between the spindle and the bar support tube.

By using the ratchet feed for the larger bars, it is possible to have a maximum one-inch capacity with a spindle small enough in diameter to stand extremely high speeds. Patents have been applied for on the new features incorporated in this bar feed.

Another feature of this machine lies in the possibility of arranging the cross slide as a lever feed or screw feed type, or a combination of the two, by simply substituting the required parts in the cross slide.

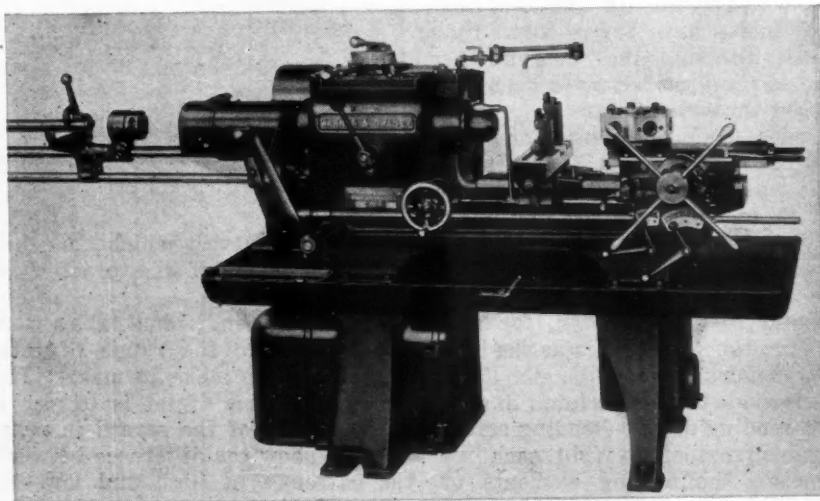
The power feed is entirely new and has been especially designed for continuous operation at high speeds. The initial reduction from the spindle is by V-belt.

The six feeds for the hexagon turret range from .003 to .030. There is an option of two change gears which will reduce the feeds by one-half.

T-C Tool Lapping Machine

The Porter-Cable Machine Co., Syracuse, N. Y., has brought out its Type D-5 tungsten carbide tool lapping machine which supersedes the type D-4 announced some time earlier. The new machine is said to provide a simple and convenient method of lapping and one which has its advantages also in the maintenance of high-speed-steels.

All mechanism is fully enclosed, the motor and driving parts being housed in a streamline frame which also acts as a pedestal. A special ball bearing vertical motor is mounted inside of the housing and speeds are easily and quickly obtained by opening door and changing "V" belt to different steps on the "V" pulleys. Four different speeds are obtainable—600, 900, 1200 and 1800 r.p.m. with an 1800 r.p.m. motor and proportionate speeds with motors of other speeds.



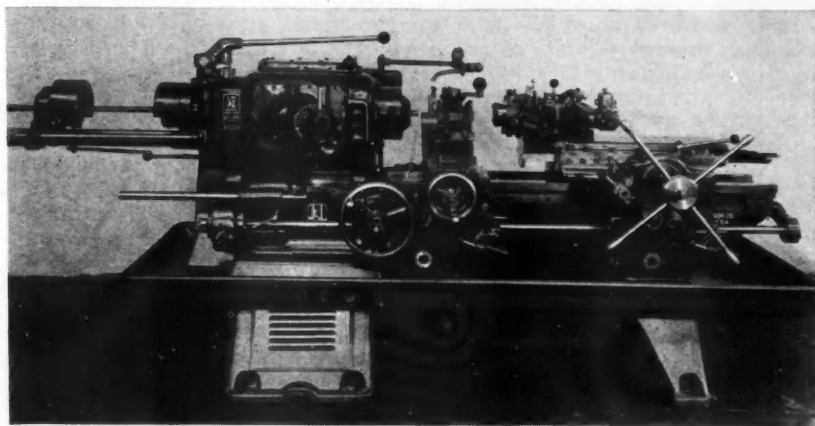
Warner & Swasey turret lathe

Ram Type Turret Lathe Has One-Lever Control

Jones & Lamson Machine Company, Springfield, Vt., announces a universal ram type turret lathe line of completely new design and with many new features. They are built in two sizes, $1\frac{1}{2}$ -in. and $2\frac{1}{2}$ -in. bar capacity.

The fundamental purpose of this new design is to permit the use, at the highest efficiency, of the latest types of carbide cutting tools with ample margin for future developments in that field. At the same time there is combined in the same machine all the factors of mechanism, convenience and accuracy necessary to perform ordinary turret lathe operations with ordinary tools at the highest available efficiency.

EQUIPMENT SHOW



Jones & Lamson turret lathe

A single lever dial selector controls all speed changes. One lever controls the forward and reverse motion of the spindle and when it is moved to the neutral position an adjustable brake for stopping the spindle is automatically applied. The forward and reverse clutches and the brake are of multiple disc type. The machine has twelve selective forward and reverse spindle speeds, two ranges of which are standard equipment, namely: 20 to 1000 or 40 to 2000. This range covers the requirements of all cutting tools from carbon steel to carbide.

Two types of driving units are standard—a flange type motor mounted integral with the headstock, or a motor mounted in the cabinet leg with the drive through multiple V belts.

The carriage is the universal bridge type and is made exceptionally heavy for support of the many tools that may be in operation at one time. T-slots in the front and rear of the carriage cross slide provide for multiple tooling. Standard equipment includes a square turret on the front and a dovetail tool slide on the rear.

The square turret is controlled entirely by one lever. Each turret face is drilled so that a multiple tool block, with a capacity of four tools, can be mounted on each face. Maximum multiple tooling for rear mount tools may be attained by means of dovetail tool blocks fitted to the tool slide.

The carriage apron is equipped with a sliding gear transmission for nine variable longitudinal and cross feeds, all controlled with a single lever dial selector. All feeds can be changed while the machine is running. The range of feeds for longitudinal travel is from .005 to .100 and the cross feed range is from .0025 to .050 per revolution of the spindle.

The machine is fitted with a hexagon turret with all faces bored, counter-bored and drilled for mounting standard bar and chucking tools. It is indexed from one position to the next with a star wheel. The turret is equipped with an automatic clamp ring. On the return movement of the slide the turret is unclamped, indexed to the next position and on the forward motion automatically clamped. It is equipped with six adjustable stops.

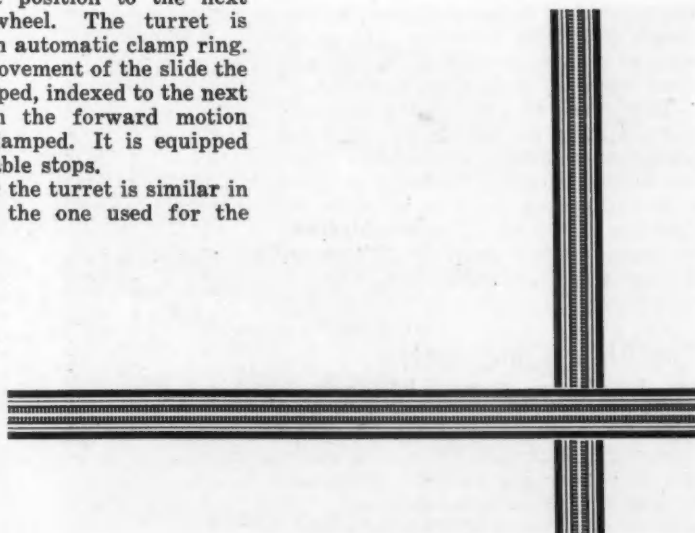
The apron for the turret is similar in construction to the one used for the

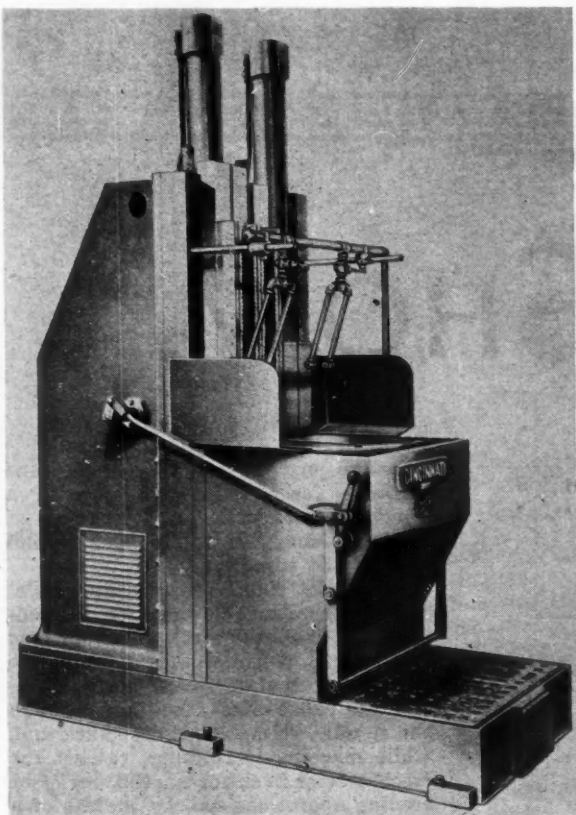
carriage and is equipped with nine variable feeds all controlled with a single lever dial selector. The range of feeds is from .005 to .100 per revolution of the spindle.

The collet chuck has a master collet fitted with removable jaws for different sizes and shapes of stock. The bar feed mechanism permits the operator to stand at normal operating position, unlock the collet chuck, feed bar through the spindle, clamp the collet chuck and, while machine is running, ratchet the stock carrier back for another series of feeding operations—all by the use of a single lever.

Grinding Spiral Bevel and Hypoid Gears

The No. 14 Spiral Bevel Gear Grinder recently announced by Gleason Works, Rochester, N. Y., is said to solve the problem of correcting the deformations which occur in heat-treating spiral bevel and hypoid gears. It permits the teeth of any gear (not





Cincinnati new
Hydro broaching
machine

pinions) within its capacity to the close limits found possible with grinding.

The tooth surfaces are ground with a flaring cup wheel. The use of this type of wheel is said to have advanced the art of grinding spiral bevel and hypoid gears to the point where it is now possible to grind them faster than it is possible to finish cut them. This wheel is carried from end to end by an oscillating motion to grind the teeth for their full length.

In the grinding operation the gear is held stationary and the wheel is fed into the gear until the full depth position is reached. The wheel is then withdrawn and the gear indexed. Alternate grinding and indexing proceed until all the teeth have been ground. Then the machine is stopped automatically. Separate feed cams are provided for rough and finish grinding. The movement of a lever by hand shifts the cams from roughing to finishing positions.

This machine is automatically stopped after the last tooth space has been ground, and a tell-tale light then notifies the operator that the machine is at the proper point in its cycle for dressing the wheel. The wheel spindle is swung up into dressing position by moving a control lever.

The New Cincinnati Hydro-Broach Machines

The Cincinnati Milling Machine Company, Cincinnati, Ohio, now offers complete broaching machine equipment for any kind of surface broaching. The addition of a line of hydraulically oper-

ated duplex vertical broaching machines to the line of manufacturing milling machines enables this company to offer users of high-production equipment, cost-reducing milling or broaching equipment which will meet their requirements as to production, size finish, etc.

The Cincinnati vertical duplex broaching machines which make up the Hydro-Broach line are said to have been designed to give the best possibilities for surface broaching and to do this most economically. There are three machines of 2, 5 and 10-ton capacity, each having a normal and extended stroke.

The indexing of the table is controlled by a hydraulic mechanism in-

terlocked with the operation of the vertical rams. The broach on the descending ram engages the work in the fixture which has been indexed to the cutting position, while the fixture on the opposite side of the table has been indexed to clear the broach on the ascending ram. At the completion of the cutting stroke of one ram and the return stroke of the other ram, the rams stop, the work-table indexes, the rams reverse their direction of movement, and the cycle of operation repeats itself. Indexing time is small. Practically continuous production is obtained, the operator removes and replaces work in one fixture while the work in the other fixture is broached.

Remco Line of Motor Drives

In the interest of motorizing production equipment in the multitude of machine shops throughout the automotive industry, Manley Products Corp., York, Pa., has developed the Remco line of motor drives. The line consists of a number of universal mounting bases to accommodate any make of motor, this being combined with a suitable attaching hook-up.

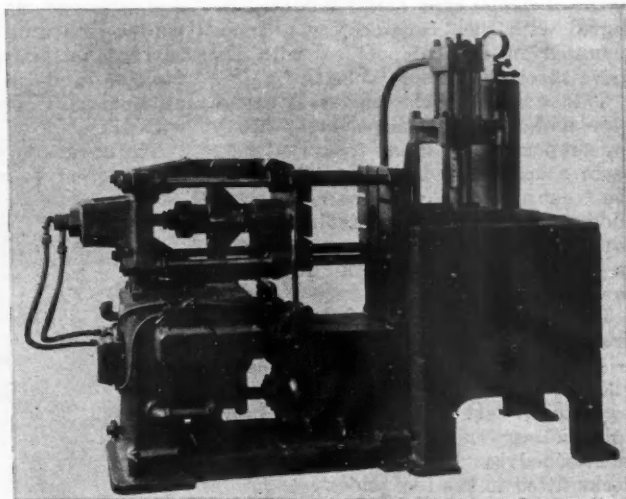
Remco motor drives have been engineered for a great variety of production machines, including drill presses, shapers, milling machines, grinders, etc. The standardized motor drive offers many interesting possibilities.

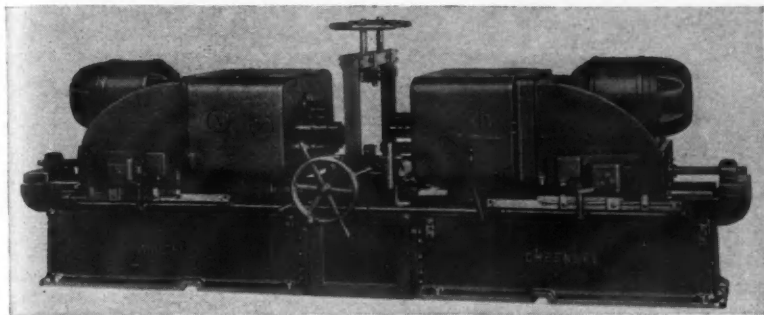
Fully Hydraulic High Speed Die Casting Machine

A new fully hydraulic die casting machine, No. H-HP-1, has been announced by the Lester Engineering Co., Cleveland, Ohio. It is the culmination of ten years of experience with hydraulic, semi-hydraulic, automatic and manually controlled die casting equipment.

High productive speed up to 600 operations per hour is obtained by means of a fast moving hydraulic toggle

Lester high
speed die-
casting ma-
chine





Greenlee two-way boring machine

mechanism for die movement. This device is positive acting, developing a safe locking pressure of 35 tons. This power can be utilized in pulling large cores. In conjunction with this die operating mechanism, is an automatic plunger control which eliminates all lost time between the various phases of the cycle of operation.

Metal to be cast is injected into the die by the solid displacement method. The injecting device is so constructed as to function properly for the life of the vital parts. Wear between the plunger and metal cylinder is automatically taken up and metal pressure is always maintained.

The operation of the No. H-HP-1 machine is controlled by a single lever. Pulling the lever out will close die hydraulically. As soon as the die is completely closed and locked, the plunger will operate, forcing the metal into the die. The plunger will remain down, holding pressure on the metal, for as long a period of time as required for the particular part being cast. There is an easily accessible adjustment which makes it possible to vary this time delay accurately. The plunger will then return to its original position by pushing the operating lever back and the dies will again be opened.

Two-Way Horizontal Boring Machine

The two-way horizontal boring machine shown here was recently built by Greenlee Bros. & Co., Rockford, Ill., for stub boring the bearing holes in two different-sized tractor transmission housings. It is provided with two sets of interchangeable boring heads. The fixture is built to receive both sizes of housings and requires no change-over when boring either piece.

Guide bushings are not required in the fixture, since the accuracy and rigidity of the spindle construction in the heads and the use of hardened and ground steel ways provide for holding the work well within the required limits. Each set of boring heads is arranged with six and seven spindles, respectively, ranging in size from 1.941 in. to 8.003 in. Inserted blade cutters are provided to rough, semi-finish and finish bore the housing, since all holes are bored through.

The machine is built with unit construction from the base up. The base consists of two opposed bed wings attached to a center section, upon which is mounted the work-holding fixture. All other faces of the center section are machined for mounting additional bed wings, should they be required at a later date.

Two Greenlee 25 hp., Standard, Self-contained, Hydraulic Drive Units are mounted on 24-in. hardened and ground steel ways. Units of this type are built in four sizes ranging from 5 to 50 hp. and can be adapted to a wide range of drilling, boring, reaming, milling and other operations.

Board Drop Hammer Has Alloy Frame and Anvil

A new board drop hammer, known as Model J, has just been announced by Chambersburg Engineering Company, Chambersburg, Pa. This hammer incorporates a number of new features, chief of which is the use of a Nickel Molybdenum alloy for frames and anvil. This alloy, Cecolloy, is made in Chambersburg's redesigned air furnaces and shows similar damping properties to ordinary cast iron, but with a tensile strength in excess of 50,000 lbs.

Among the refinements incorporated in this machine are: an extremely

simple motor-driven head, consisting of only two main sections, which house the eccentrics, rolls, and driving mechanism, with a cap to close the gear box; the driving mechanism, practically a spur-gear reducer, the gears of heavy pitch with wide face; bearings are heavy duty Hyatt roller bearings; motor rigidly connected to the head and coupled to the driving mechanism by a flexible coupling; the anvil (a Cecolloy casting) has a ratio of 20-to-1 to falling weight and secures and maintains alignment by non-twisting, non-rocking frame-to-anvil connections and by the patented Chambersburg cross-guided joint.

A rod, giving universal and quicker adjustment, replaces the usual notched rack for adjusting the releasing lever position. Greater speed, more accurate forgings, less down time and lower costs are claimed for this hammer.

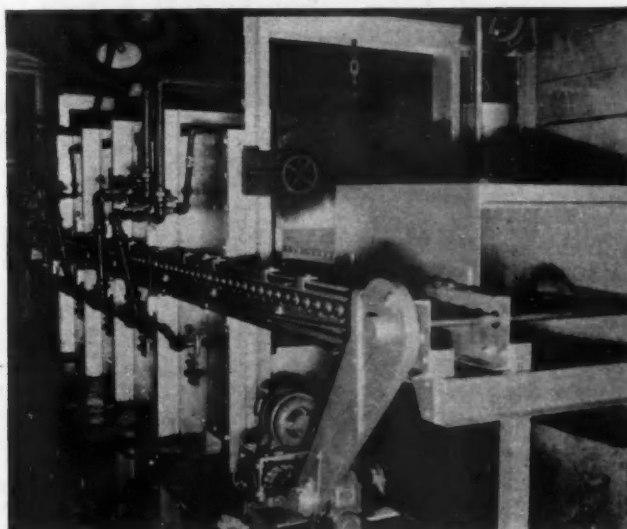
Continuous Roller Hearth Type Furnace for Clean Annealing

A new continuous roller hearth type furnace for clean annealing and various other heating operations on stampings and miscellaneous other products has been developed by The Electric Furnace Company, Salem, Ohio.

The conveyor of this furnace consists of a number of rolls driven by means of a variable speed mechanism. The material to be heated is carried through the furnace directly on the rolls.

This furnace can be arranged with automatic feed as well as automatic discharge, and may be placed right in the production line. These furnaces may be fired with any kind of manufactured or natural gas, fuel oil or electrically heated, and because of the type of conveyor employed are very efficient with reference to fuel consumption.

The accompanying photograph shows the charging end of a gas fired installation and shows the variable speed mechanism for operating and controlling the speed of the rolls.



Continuous roller hearth type of furnace from the Electric Furnace Co.

6 in. Stub Lathes in Three Models

Sunstrand Machine Tool Co., Rockford, Ill., has just placed on the market a line of 6 in. stub lathes in two types with three different models for each type. The lathes are built in fully automatic and semi-automatic types. The cycle of the Semi-Automatic Lathe illustrated here is: Rapid approach by manual operation of large handwheel on front of machine; spindle, feed, and coolant-pump start and stop automatically; rapid return by manual operation of handwheel. Operation cycle of the Automatic lathe is: Power rapid approach started by operating lever on front of machine; spindle, feed, and coolant-pump start and stop automatically; rapid return engages and stops automatically. Both types are built in 3 models as follows:

Model A—Has chain drive from motor to speed box, gear drive to spindle, spindle speed-range from 62 to 663 r.p.m.

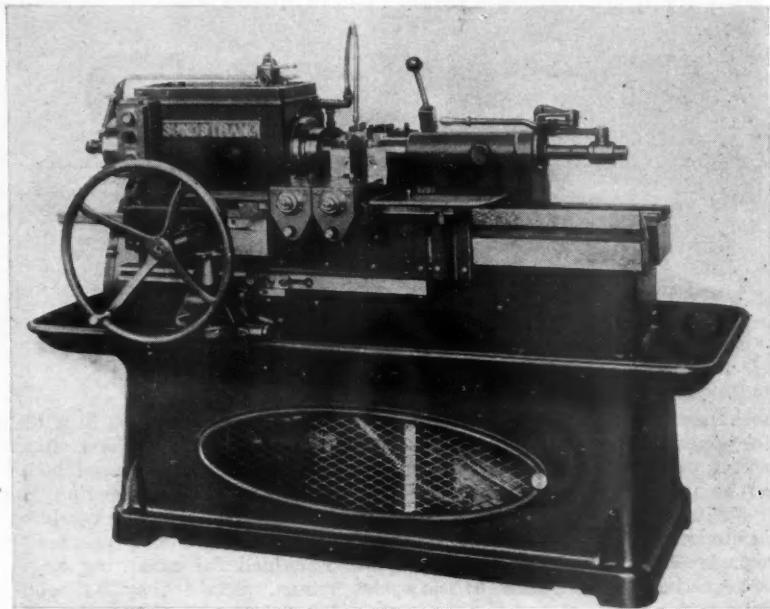
Model B—Has chain drive from motor to speed box; gear drive, including non-metallic idler, to spindle; spindle speed-range from 192 to 1790 r.p.m.

Model C—Has flat belt drive direct from motor to spindle, spindle speed-range from 1000 to 3500 r.p.m. Motor pulley has a taper hole which fits a tapered bushing on the motor shaft. This construction makes it easy to change motor pulleys in two or three minutes.

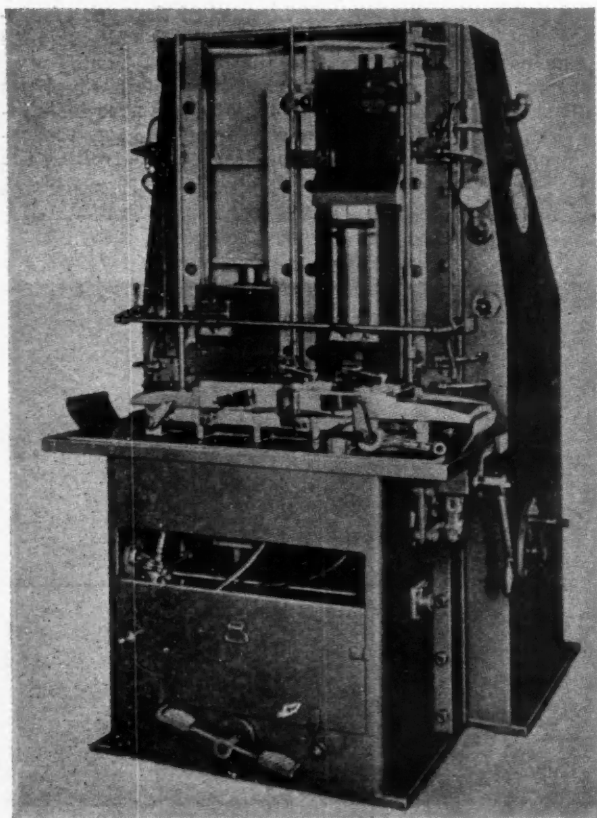
These lathes incorporate a number

of improvements in construction as well as certain new and exclusive features of design.

Electrical equipment for both models includes a 3 to 5 hp. motor for the spindle drive and a one hp. motor for the rapid traverse drive on the automatic machine. The net weight of the machine is 3600 lb.



Sunstrand stub lathe



Lapointe vertical
hydraulic broach

Variable-Speed Hydraulic Surface Broaching Machines

The Lapointe Machine Tool Co., Hudson, Mass., has entered the surface broaching field with a line of vertical hydraulic machines having variable speeds. This line may be had in a 3-ton size single or double-ram type, a 6-ton capacity, single and double ram type, and 12- and 20-ton capacities in the single-ram type only.

The machines are made principally of electric welded steel, except that the main pressure cylinder and the broach slide are of cast semi-steel. The broach slide is pulled downward on its working stroke so that the piston rod is under tension. A foot pedal and hand lever are provided for the operator. The foot-pedal control is for production use and is of the non-repeat type. Both the up and down strokes are controlled either by the foot pedal or the hand lever, or may be arranged so that when the foot pedal is depressed the ram will make a down stroke and then return to the upper position and stop automatically. The hand lever may be used to get the same cycle as with the foot pedal.

Self-Contained Plastic Molding Press

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has recently developed a new line of molding presses with individual electric motor drive, through the patented H-P-M "Dual-Speed" hydro-power transmission. Each press is compactly self-contained with press cylinder and control valve equipment enclosed within a pedestal, which also contains the supply of operating oil.

The outstanding feature of the press

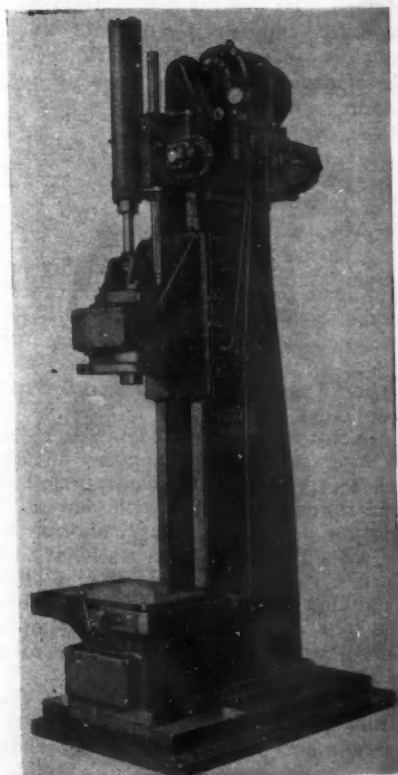
is the system of controls. These not only provide adjustable automatic pressure control, but also regulation of speed of ram movements and an entirely new patented control principle, especially developed by H-P-M for plastic molding, whereby the rate of pressure increase is automatically governed according to predetermined adjustment.

The press is arranged for rapid closing of the molds as a means of saving time. However, the speed of both closing and opening ram movements is controlled independently of the rate of pressure application.

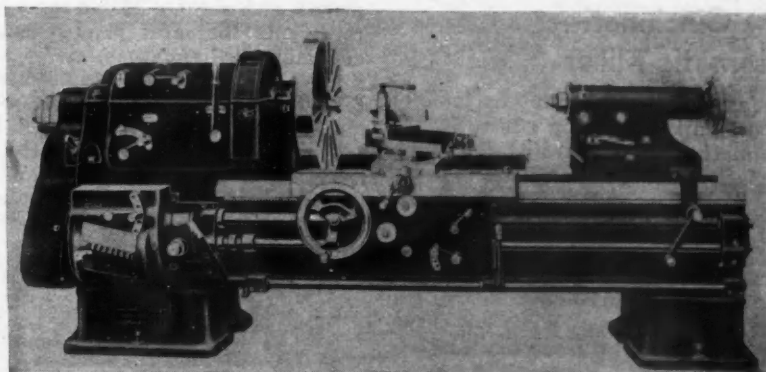
The molding press, illustrated, is fitted with bolsters and power ejectors to operate semi-automatic, multiple cavity chambered molds with knockouts. This type is available in six standard sizes ranging from 50 to 300 tons pressure capacity.

Barnes Introduces Upright Drill

The W. F. and John Barnes Company, Rockford, Ill., has recently designed an upright drilling machine, No. C-12, which is equipped with a unit on top of the column that embodies the drive to the spindle and a hydraulic feed mechanism. This unit comprises high- and low-pressure pumps and an oil reservoir for the hydraulic feed. With one motor driving the spindle and the hydraulic feed mechanism, a uniform condition is maintained between the feed and speed of the spindle. The machine is especially adapted to multiple-head operations.



Barnes upright drill



Cincinnati lathe with automatic lubrication

Sliding gears in the spindle head provide two speed changes in addition to changes obtained by means of pick-off gears in the gear-box. Speeds from 75 to 1200 revolutions per minute are obtainable when a motor of 1200 revolutions per minute is used. A clutch of the internal sliding-gear type, located in the sliding head, permits of disconnecting the spindle drive, so that the head can be traversed on the column with the spindle at rest.

The hydraulic feed cylinder is mounted on an extension of the gear-box directly over the center of the spindle. The ram of the cylinder is directly connected to the center point of the sliding head, so as to give a direct-line application of the feeding force. This eliminates any offset tendency that would tend to crank the sliding head on the ways. The feed cycle obtainable includes a rapid traverse in both directions, a slow feed for drilling, and, if required, a dwell at the end of the drilling stroke.

The rate of rapid traverse is constant, but the rate of slow feed is adjustable by changing the setting of the high-pressure pump. The control valve for the hydraulic feed system is mounted on the right-hand side of the column. Feed-control dogs are carried on a bar on the side of the sliding head. By operating a single hand-lever, the machine can be thrown, at will, into rapid traverse in either direction, slow feed, or neutral. The sliding head has a travel of 24 inches on the column.

A similar machine is built in a larger size, No. C-20.

Simplified Lathes With Many Exclusive Features

The current line of engine lathe made by The Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio, now features anti-friction bearings and automatic lubrication on all models. The lathes are available in sizes from 14 in. to 32 in. and in 2 foot bed lengths from six feet and over.

The heavy-duty model, illustrated, swings 23 in. over ways and with an eight foot bed takes work 46 in. between

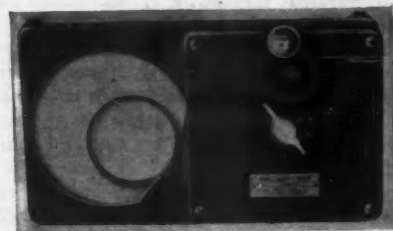
centers. It weighs 6500 lb. and takes a 10 hp. motor.

Cincinnati patented lathes are supplied either with geared head single pulley belt or individual motor drive with motor mounted either on the head-stock or attached to the rear of the cabinet leg. Both types of drive are self-contained and can be removed as a unit.

One of the most important patented features is the locking plunger for locking the spindle when removing chucks and face plates. Use of the plunger is said to preserve the accuracy of the head as it keeps the strain off the gears and shafts.

Pedrick Has Exclusive Sales on the Ring "Mike"

The Ring "Mike" for measuring the diameter of piston rings is now sold exclusively by the Wilkening Manufacturing Co., Philadelphia, Pa., maker of



Pedrick piston rings. The Ring "Mike" is claimed to be extremely accurate because it measures all ring sizes on the same center line.

The illustration shows how the Ring "Mike" draws each ring against an angle which automatically maintains the same center line for all rings. Operation is quick and easy. Readings are made on a dial through a powerful magnifying glass in both decimals and fractions.

A master size ring is furnished with each instrument so the accuracy of the reading can be checked at any time. If necessary, adjustment of the dial reading is made simply by moving the pointer to the right or to the left so it points exactly to the size on the dial corresponding to the size of the master ring.

New Cincinnati Automatic Miller

A fast, automatic milling machine of new design is now being offered by the Cincinnati Milling Machine Company, Cincinnati, Ohio. This machine is especially desirable for low-cost milling of large or medium lots, small-size parts.

Eight spindle speeds are available up to 1800 r.p.m. by means of pick-off gears located in the column. Three series of speeds are available: low from 49 to 361 r.p.m., furnished as standard equipment unless otherwise specified; intermediate, upon request, and the high series 246 to 1800 r.p.m., at extra cost. Spindle reverse is provided. Spindle rotation is started and stopped by shifting the starting lever located at the left side of the machine. A multiple disc friction clutch is used.

Sixteen table feeds up to 80 in. per minute are available with pick-off gears. Standard series ranges from 2 in. to 80 in., and special series supplied at extra cost from 1 in. to 40 in. The pick-off gears are conveniently located under the cover that is held in place by one cam lever at left side of knee.

The table has a complete automatic working cycle which includes a sensitive control lever for engagement, 400 in. per minute power rapid traverse, and dog-controlled intermittent feed and rapid traverse in any combination or direction depending upon the type and number of table dogs employed. The entire arrangement provides for extreme accuracy of trip.

The position of the control lever determines the direction of the table travel and also whether the table is moving at the feed or rapid traverse rate. A single lever to the right of the vertical adjusting crank starts and stops the table movement without affecting the operating cycle. Power longitudinal travel is 12 in. with rack feed. Hand adjustment of the table may be secured by means of a crank which can be engaged on the right side of the knee.

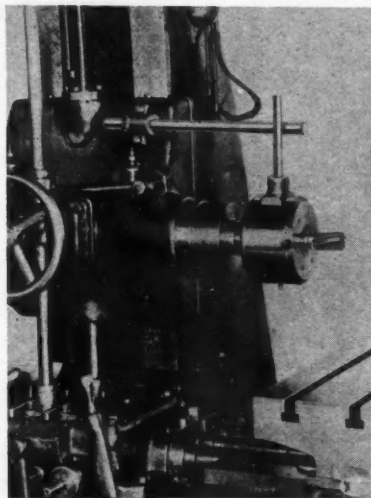
The table is located at a height convenient for fast work handling. Working surface is 8½ in. x 25¼ in. One T slot—11/16 in. wide—extends the entire length of the table.

Ex-Cell-O Has New Milling Head

Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., announces a new high speed milling head for use on horizontal boring mills and milling machines. This unit provides a higher range of speed which is required for the smaller sizes of end mills and drills. The driving shank of the head is furnished with a No. 5 Morse taper which makes it adaptable for use in all boring mills and milling machine spindles. The spindle in the high speed head is fur-

nished with a No. 4 Morse taper which represents the most popular size for end mills, drills, chucks, etc.

The step-up ratio of the head is four to one over the spindle speed of the machine. The unit is designed for a top speed of 1500 r.p.m. on the high speed milling spindle and has a maximum capacity of 1-in. diameter end



Ex-Cell-O high speed milling head

mills and 1-in. diameter drills in steel.

A boss is provided on the outside diameter of the milling head to support a torque bar which engages with another bar mounted on the column of the machine parallel to the axis of the machine spindle.

Hydraulic Crank Pin Grinders

The new Landis 16-in. Type D Hydraulic Crank Pin Grinder just announced by the Landis Tool Company, Waynesboro, Pa., is a highly refined machine for the rapid production grinding of crank pins. Like the first Landis hydraulic crank pin grinder announced nine years ago, the major advantage of the new Type D is the combination of design features which make possible grinding all the pins of any crankshaft on one machine with but one handling of the work. This is brought about by attaching the work rest to the front of the bed and properly coordinating the work rest jaw movement with the wheel feed, the table traverse and the means provided for clamping, radial locating and longitudinal spacing.

Crank head spindles and bearings are larger than they have been heretofore. The wheel drive motor is mounted on the rear of the massive wheel head. From this point it drives the wheel spindle on the end by means of multiple V belts. The wheel spindle is large and the long bearing surfaces of the babbitt-lined steel wheel spindle bearings give it solid support.

Controls are arranged in such a manner that the main control lever has a large number of functions. As it is shifted from one position to another it (1) clamps the work, (2) starts work rotation, (3) advances the work rest shoes, (4) withdraws the work rest shoes, (5) disengages the spacing bar plunger, (6) traverses the work table either right or left, and (7) releases the spacing bar plunger. Another convenient lever to the left of the main control lever is used to unclamp the work.

Because the grinding of crank pins is at best a complicated operation, numerous safety features have been provided to protect the machine and operator from injury in the event there is a slip-up at any point. A mechanical inter-lock in the main control mechanism makes it impossible when grinding to traverse the table or when traversing with the wheel in (that is, during truing) it is impossible to rotate the heads. The heads will not rotate with the work unclamped nor will the heads rotate during work table traversal. As long as the work rest shoes are in their operative position the work table cannot be traversed. If for any reason pressure in the hydraulic system drops, work rotation will automatically stop.

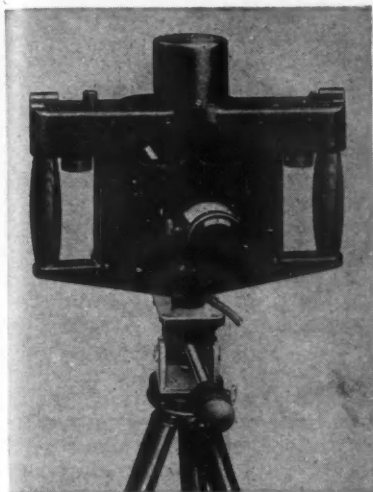
Hydraulic power is employed to traverse the work table, feed the grinding wheel, operate the work clamps and spacing bar plunger and move the work rest shoes. A 36-in.-diameter grinding wheel is considered standard, although 42-in. wheel equipment is available. Another interesting piece of optional equipment is a wheel dresser built into the top of the grinding wheel fender. The dressing wheel is hydraulically driven. Its use facilitates dressing the wheel inasmuch as the dressing wheel is always set up and the work need not be removed during the dressing operation.

A Stroboscope That is Also a Tachometer

To enable the study of rapidly moving machine parts and their function while in motion, a new type of Stroboscope of Zeiss-Ikon make is being introduced in this market by the George Scherr Company, 128 Lafayette Street, New York City, N. Y.

In this instrument, the part in motion is observed through a rotating slit disc, whose speed can be readily regulated and timed to coincide with that of the moving object. In this condition the object will appear to be stationary and permit its examination. By a slight reduction of the speed of the slit disc, the phase under observation can be moved so as to cover the entire range of the period.

In addition to the observation of kinematic processes, the Zeiss-Ikon Stroboscope may also be used as a tachometer, being equipped with a built-in Speed Indicator. It permits the meas-



Zeiss-Ikon Stroboscope

urement of speeds up to 140,000 r.p.m. strictly optically.

The Stroboscope may also be equipped with a pair of prism binoculars, where it is desirable to get a closer view of the object, or where it may be too dangerous, as for instance on airplane propellers, to approach it too closely.

Van Norman No. 12 Milling Machine

A milling machine for toolroom and pattern shop has been announced by the Van Norman Machine Tool Co., Springfield, Mass. The No. 12 machine retains the adjustable cutter head and movable ram typical of all Van Norman millers. The cutter head is adjustable not only for horizontal and vertical milling, but also for angular settings over a 90-degree range. With the subhead attached to the face of the main head, almost any angular surface can be obtained through the full travel of the table, using a standard right-angle cutter.

All cutter-head drive gears are contained within the ram, the ram and the cutter head making up one complete unit having no drive connection with the rest of the machine. Anti-friction bearings are used throughout the machine. Standard cutter speeds range from 70 to 1465 r.p.m., and higher speeds can be obtained if desired.

Motor is mounted on the top of the ram and the drive from the motor to the cutter-head drive gears is by a heavy V-belt. A separate motor, mounted at the back of the machine below the feed gearbox, serves for the table feed.

Cuts Body Clean Costs

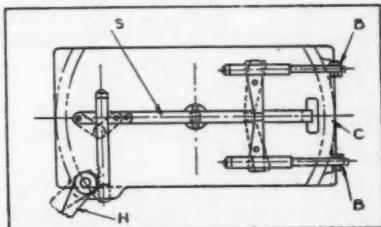
A pressure washing method for cleaning bodies prior to finishing operations has been developed by the Tridex Machine Corp., New York, N. Y. The

process was first introduced for service cleaning but now has been extended to factory operations using new equipment suitable for use with a source of steam having a pressure of 75 lb. or more. Recently an installation was made in a very prominent car assembly plant.

The Tridex process creates and delivers a finely atomized spray of warm soapy water continuously, at uniform pressure, for washing and cleaning all greasy, muddy and dirty surfaces. It also creates an atomized spray of clear warm water for rinsing. Both sprays are made from soft water, produced automatically by the machine.

Index Bases With Single Control

Sunstrand Machine Tool Co., Rockford, Ill., has perfected a line of index base with single lever control for many types of milling machine application including automatic pneumatic and automatic hydraulic index mechanisms. The base will handle a multiplicity of indexing fixtures. The development is intended to fill the need for standard attachments suitable for millers and



other types of machine tools. The illustration shows how movement of single lever H operates clamping bolts B-B, through the two pairs of powerful toggles and slide S, to clamp the upper and lower parts of the index base securely together or release the upper part for easy, free rotation.

Simplified Air Clutch

A simplified air clutch is now offered by The National Machinery Company, Tiffin, Ohio, as alternate equipment for the quadruple abutment starting and

stopping clutch used on National forging machines. This clutch is said to eliminate the noise and shock that accompany starting with the positive type clutch.

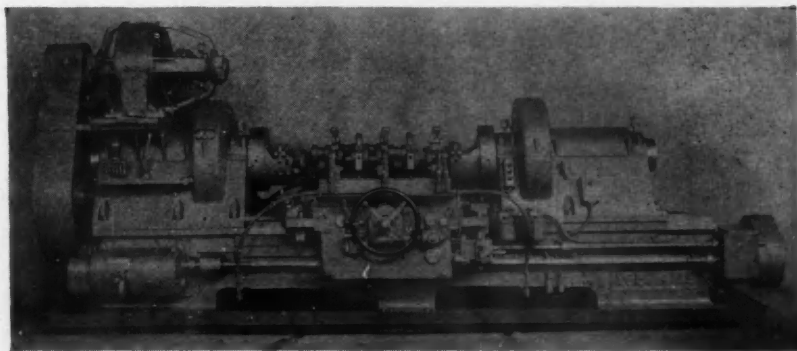
Multiple disks of unusually large area are quickly forced together by air pressure applied through a large-diameter plunger. When the pressure is released a set of compression springs immediately separate the friction plates. Thus, with generous-sized disks to lower the unit pressure and with fast-operating opening and closing devices to reduce wear and heating effect, a low temperature is maintained at all times, even when tripped at frequent intervals.

Duplex Double End Crankshaft Lathe

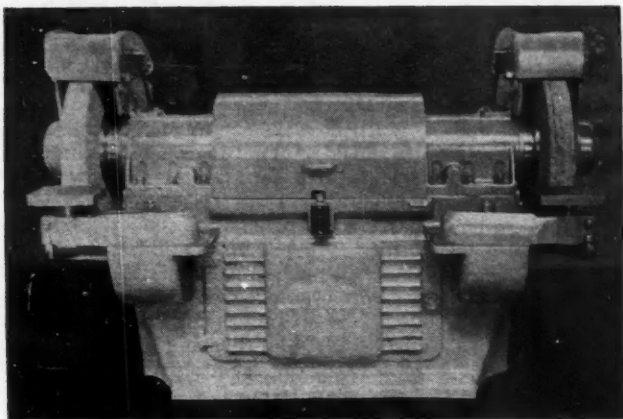
The illustration shows a general view of the 38 in. heavy duty duplex type double end drive Crankshaft Lathe, made by Wickes Brothers, Saginaw, Mich., for the machining of unusually large tractor, aeroplane, and Diesel crankshafts. This machine has a net weight of 22,000 lbs. The lathe is provided with front and rear cross slides, having front and rear tools; with power cross feed and power longitudinal feed through quick change gear box; with automatic split feed and automatic diameter stop as well as power rapid cross traverse and power rapid longitudinal traverse.

The motor is a 25 hp., variable speed, D. C. machine with automatic speed control through field rheostat. This feature maintains a constant cutting speed of the tool bits during the long cheeking operation, from the beginning of the cut at the outside diameter of the cheek to the finish of the cut when turning the diameter of the pins or main bearings. The motor is controlled through a start-stop-jog push button station mounted near the apron.

Due to the large size of the crankshaft and its unusual hardness, steady rests are provided for supporting both the headend and tailend pot chucks. This makes an unusually rigid construction of the holding and driving fixtures, which eliminates entirely any tendency to chatter.



Wickes duplex type double end drive crankshaft lathe



Bridgeport high
speed floor
grinder

High Speed Floor Grinder

The Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn., has brought out the No. 161 high speed floor grinder with a 24 in. wheel having a speed range of 1512, 1814, and 2134 r.p.m. It is driven by a 10 hp. motor and weighs about 4450 lb.

Large hole wheels are used with three speed changes, which produce a maximum wheel surface speed of 9500 ft. per minute and a minimum surface speed of 8000 feet per minute. This uses the wheel down from 24 in. in diameter to 15 in. in diameter, leaving stubs to be thrown away only 15 in. in diameter by 12 in. hole. Speeds are governed by the spark breakers.

The speed change is governed by the largest wheel. When the largest wheel reaches the point where a speed change should be made an alarm is sounded which informs the operator that he must shift the belts to the next higher speed. The mechanism is interlocking so that it is impossible to speed the largest wheel faster than 9500 surface feet per minute.

A novel feature in the machine is that instead of the usual solid spindle an individual spindle is used for each wheel. These are coupled together and driven from a common sheave on the right hand spindle.

Motor-Driven Cylindrical Grinder

A 16-in. type C cylindrical grinding machine has just been announced by Norton Company, Worcester, Mass. In general design it is similar to the 10-in. type C line announced last December, although considerably larger and heavier in every detail.

It is offered as a motor-driven machine only, the grinding wheel spindle being driven by an individual motor mounted directly on the wheel-slide. Likewise, the headstock is driven from an adjustable-speed, direct current motor mounted on the unit, while a third motor drives the pumps and table traversing mechanisms.

The machine will swing 16½ in. over the table and mounts either a 30-in. or

36-in.-diameter grinding wheel. It is built in lengths of 36 in., 48 in., 72 in., 96 in., 120 in., 144 in., 168 in., and 192 in., and is offered either with hydraulic table traverse or mechanical traverse. If desired it can also be supplied as a hand traverse machine.

The machine weighs, complete with motors, approximately 13,000 lb. for the 36-in. length and 26,000 lb. for the 192-in. length. It requires a floor space from about 7½ ft. in width (8½ ft. when a hydraulic wheel head traverse mechanism is supplied) by lengths ranging from 12 ft. for the shortest machine to 38 ft. for the longest.

Light Weight But Powerful

Chicago Pneumatic Tool Co., New York, N. Y., has brought out two new Hicycle electric tools for use in body plants and other light assembly operations. The No. 00N electric nut runner is used for nut driving and screw driving with a capacity of No. 12 to 14 screws and 3/16 to ¼-in. nut. The No. 14 and 15 electric drill has a capacity of 3/16-in. diameter drill and ranges in speed from 2000 to 2800 r.p.m.

Both tools are of light-weight construction and of compact size, in accordance with the requirements of the process. The nut runner has a pistol grip and is available with a standard clutch (rotating or non-rotating) or with a special non-rotating bell-mouth clutch which spots the screw-slot automatically.

The nut runner weighs 8½ lb. and is 14¼ in. in length; the drill weighs 4¼ lb. and its length ranges from 11 to 11½ in.

Precision Borer for Heavy Duty

The Heald Machine Co., Worcester, Mass., has announced a new heavy duty precision boring machine, the 46A double-end Bore-Matic, intended specifically for mass production of single parts or a large number of pieces which might be handled in a single setting. It is provided with two bridges, each having a capacity of four boring heads.

The distance between the bridges is 33 in., the standard maximum table travel is 14 in. The boring stroke at one end of the machine may be as much as 8¼ in., but not more than a total of 13 in. on both ends on the standard machine with 33 in. between bridges. While this gives plenty of room for the usual run of fixtures and work, should more room be required provision has been made for mounting the bridges back for two 2¼ steps on each end to give spacings up to 42 in. between the bridges.

The machine can be arranged to perform any one of a number of cycles, the change from one cycle to another being comparatively simple. As an example of available cycles—by an entirely new control of the reversing valve with the introduction of a neutral position in its travel, the table is allowed to drift into a positive stop for facing, the boring heads are stopped, with sufficient allowance for cleaning up a facing cut. The facing tools are not allowed to idle in contact with the finished work to dull their edge. The timing or dwell control of the stopping of table and heads is by convenient knobs at adjacent end of reversing valve.

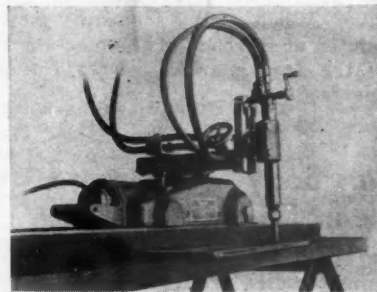
The driving motor is rated 5 hp. at 1200 r.p.m. Floor space with water tank 58¼ by 75¼ in. Net weight of standard machine without boring heads, 9500 lb.

Oxweld Cutting Machine Announced

The Linde Air Products Company, New York, N. Y., has just announced a new addition to its line of oxy-acetylene cutting machines, The Oxweld Monitor or CM-8 Cutting Machine.

The Oxweld Monitor does automatic straight line cutting of practically unlimited length, straight bevel cutting, two bevels at a time if desired, plate edge preparation, circle or ring cutting of diameters up to 100 in. and the cutting of curved or irregular shapes. It should prove an indispensable tool for the metal industry.

One blowpipe, the Oxweld C-7, is supplied as standard equipment, thus permitting cuts up to 12 in. The Oxweld C-22 Blowpipe may be substituted for heavier cutting and certain flame machining operations. Provision is made for the use of two blowpipes simultaneously. These can be mounted either on the same or opposite sides of the machine, and adjusted independently. The slide for the blowpipe



Oxweld cutting machine



Ohmer tool control register

holders is constructed so that it may be swung instantly into any horizontal position over a working arc of 250 deg. Protractor scales gage the tilting of the blowpipes in either direction parallel to the side of the machine through 90 deg., and up to 90 deg. at right angles from the side.

Steel Making Development Increases Tool Life

Working on the theory that the life of expensive tools could be considerably extended, metallurgists of Union Drawn Steel Co., Massillon, Ohio, have succeeded in developing a process for the manufacture of Bessemer screw steels said to largely eliminate the abrasive elements which tend to wear away the cutting edges of tools. This advancement has been accomplished, according to statements of the company, without change in analysis and without in any way affecting the physical properties of the material.

While no higher feeds and speeds are claimed beyond those already obtainable with steels of these analyses, this development is said to have effected important production economies through extension of tool life and elimination of frequent machine shut-downs for regrinding with their accompanying loss of production.

The new development is now being employed in the production of both Union Free Cut (S.A.E. 1112 type) and Union Supercut (high sulphur) Bessemer screw steels and all steels of these grades now sold by the company are so processed without extra cost.

Four-Slide Machine Works Ribbon Material

In addition to the line of multiple-spindle horizontal and vertical automatic lathes and chucking machines, The Baird Machine Co., Bridgeport, Conn., recently brought out an interesting application of the well-known four-slide machine.

This machine is fitted up so as to take ribbon bronze material in coil form from a reel, put ball indentations and straight line oil grooves in the same, pierce an oil hole, cut off the material

to length, and form it up into a bushing with a seam down the side. These bushings are afterward forced into holes in parts and thus constitute a bearing, the machine giving rapid production with little waste of material.

The Ohmer Tool Control Register

The Ohmer Tool Control Register, for accurately checking and controlling the issue of tools in any manufacturing plant, is one of the recent developments of the Ohmer Register Company of Dayton, Ohio.

This register somewhat resembles the Class 800 Ohmer Cash Register but is built without a cash drawer and adapted to the specific purpose of giving complete control over the issue of tools. The register is installed at the tool crib. It mechanically prints and issues two copies of the tool order showing the date the tool was requisitioned, the tool number, the class of tool, the employee's check number and the consecutive number of the order. An exact copy of the tool order is also printed on a locked in record within the register. One copy of the tool order as printed and issued by the register is signed by the employee. This copy is then filed according to his check number and the other copy is filed in the tool card file according to the tool number.

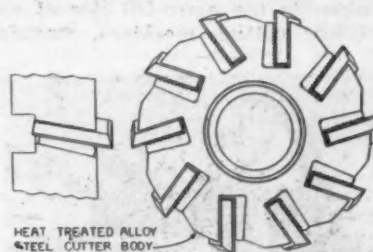
Milling Cutters of New Design

A new type of serrated blade milling cutter known as the "Rigidback" series is being made by Cowles Tool Company, Cleveland, Ohio.

This design follows the principle that the cutting tool should be rigidly supported by a true conforming surface and therefore the blade is made parallel with a ground surface on the side mating the cutter body. The double taper wedge is provided with serrations permitting the adjustment of the blade for the diameter of the cutter.

The manufacturers claim that a minimum amount of labor and equip-

ment is required to adjust the blades prior to re-sharpening. Cutter bodies and wedges are regularly made of heat treated alloy steel with high-speed steel



HEAT TREATED ALLOY STEEL CUTTER BODY

ment is required to adjust the blades prior to re-sharpening. Cutter bodies and wedges are regularly made of heat treated alloy steel with high-speed steel

blades, although cemented carbide tipped blades are well suited for this rigid type of cutter. The illustration shows the "RIGID-BACK" shell end mill which is interchangeable with the National Standard shell end mill.

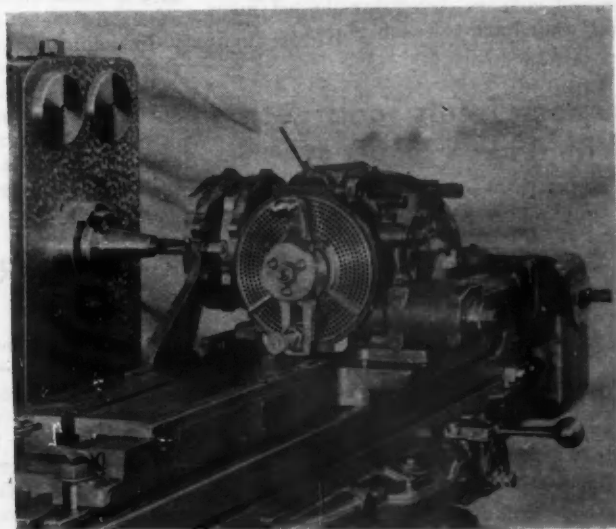
New K & T Cam Milling Attachment

Kearney & Trecker Corporation, Milwaukee, Wis., has developed a new cam milling slide for use with Model K Universal milling machines. The unit, in combination with the dividing head and tailstock furnished with the machine, converts the standard milling machine into a highly efficient and accurate cam miller. The unit consists of a special slide and base and a roller bracket.

Power drive for the head is obtained from the spiral change gear unit on the end of the table. The slide movement is provided by pressure of the roller following the contour of the master cam. A weight attached to the slide holds the roller firmly against the face of the master cam.

One of the features of the attachment is that in many cases a finished cam can be used as the master cam for cutting duplicates.

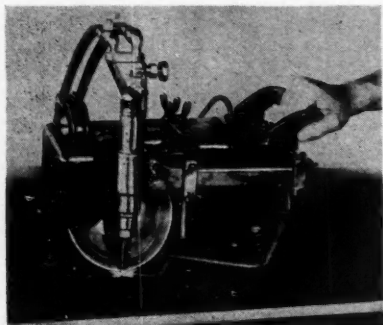
The slide, when used on a No. 2 machine, will accommodate cams up to 10 inches in diameter and 5 inches of travel. Maximum distance between centers is 12 inches. The attachment complete weighs 325 lb.



Kearney & Trecker mill attachment

The New Airco Tractograph

The Airco-DB Tractograph, latest addition to the Airco-DB line of oxy-acetylene cutting machines, manufac-



tured by the Air Reduction Sales Co., New York, N. Y., is said to provide a simple means for accurately cutting steel plates and slabs up to 2 in. in thickness into shapes having straight, circular or irregular outlines and extending over practically unlimited areas.

It is a small, compact, motor-propelled unit weighing but 48 lb. which can be quickly adjusted to travel at any speed from 2½ in. per minute. As it travels it is guided by hand along the desired contour laid out and scribed directly on the plate or slab.

New Type Portable Grinder

Chicago Wheel & Mfg. Co., Chicago, Ill., announces a portable electric grinder of the universal type with a built-in viscous-type air filter, effectively filtering all air entering the motor.

The new tool weighs 4 lb., turns up 17,000 r.p.m., and has ample power to pull a wheel 2 in. in diameter. Motor housing, of heavy cast aluminum, extends out over the motor shaft and air filter, and is encased with an insulating cushion grip, giving positive control and operating flexibility. With suitable grinding wheel or cutter, the tool will work at an angle and get into and around corners, irregular-shaped holes and other hard-to-reach places.

Furnace Treats Tools With Radio Frequency

Experiments are being made by the Westinghouse Electric Mfg. Company, East Pittsburgh, Pa., on the use of radio frequency in the heat treating of small tools. Radio frequency current from an oscillator is made to pass through a coil about the size of an ordinary coffee cup. The tools to be treated are placed inside of this coil and their opposition to the flow of the radio frequency current through the coil causes them to become heated to the degree required for treatment.

One small model weighing not over

75 lb. was manufactured at the radio division of the Westinghouse company in Chicopee Falls, Mass., and has been successfully used in the treatment of lathe tools, drills, etc. The model as it was arranged was very convenient, especially for small quantity production of small tools. Where the ordinary gas furnaces are not available, or where regular furnaces are too costly to start up for only a few tools, this radio frequency furnace is extremely useful.

Tubes used in the oscillator are of the same type as those used in ordinary broadcasting transmitters.

A New Line of Dial Indicators

A complete line of dial indicators has just been added to the line of the L. S. Starrett Co., Athol, Mass.

Several important design and construction features are said to make these indicators exceptionally accurate and durable. Stainless steel and chromium plating are used extensively to make them completely rust proof—the gears, rack, dowels, screws, stem, bushings, etc., being stainless steel and the case and bezel chromium plated. The back is a solid die casting, recessed to hold the lug for clamping the indicator to tool spindles, machinery, production jigs or fixtures.

Among the indicators available are models reading in thousandths of an inch, half-thousandths of an inch, ten-thousandths of an inch, hundredths of a millimeter and five-hundredths of a millimeter, including gages that show both plus and minus measurements.

Top Charge Furnace Cuts Costs

One of the recent developments of the Pittsburgh Lectromelt Furnace Corp., Pittsburgh, Pa., is a patented lift and swing-aside-roof, quick top-charge, electric melting and refining furnace. It is made in the intermediate and larger sizes and features many economies in operation.

In addition to the saving in labor cost due to fewer operators per unit, only a 3 to 5-minute power-off to power-on interval is required. The unit also is said to materially reduce electrode and power costs as well as to increase refractory life.

Automatic Repeat Weld Timer

For use with resistance welding machines in which the electrodes are air or motor-operated, The Electric Controller & Mfg. Company, Cleveland, Ohio, announces the EC&M automatic repeat weld timer.

This timer is the same as the standard EC&M automatic weld timer except

that it has an additional timing circuit for governing the length of time the electrodes of the welding machine are separated. The "welding-period" provided by this timer varies in inverse proportion to the rate of current flow insuring the correct number of heat units are put into each weld, while the "off-time" or period the electrodes are apart is a definite length of time which is adjustable.

Modernized Arc Welder

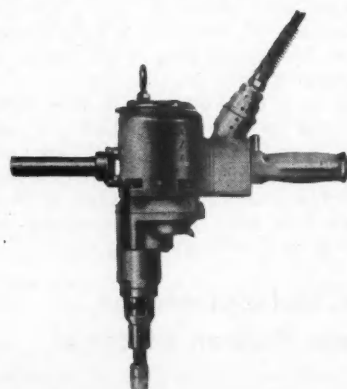
An inexpensive modernization of manually operated arc welders has been developed, using an air cylinder manufactured by the Hanna Engineering Works, Chicago Ill., is available in 3-in. diameter and larger sizes. It is furnished to fit the flange of the ram barrel, eliminating the necessity of any machine work on the welder.

A Hanna air (or hydraulic) cylinder is mounted on the flange of the barrel surrounding the ram closing the electrodes. A pressure-regulating valve enables the operator to secure the pressure desired on the electrodes. The cylinder is controlled by a foot-operated valve.

This arrangement, in addition to relieving the operator of the manual exertion of closing the electrodes, insures correct and uniform pressure for each weld. Thus an operator secures more welds per day and with the same pressure applied to each throughout the operator's entire shift.

Shockless Nut Runner

The Buckeye Portable Tool Co., Dayton, Ohio, has placed on the market the Hercules high frequency electric "Shockless" nut runner featuring an adjustable releasing clutch which tightens the nut without shock to the

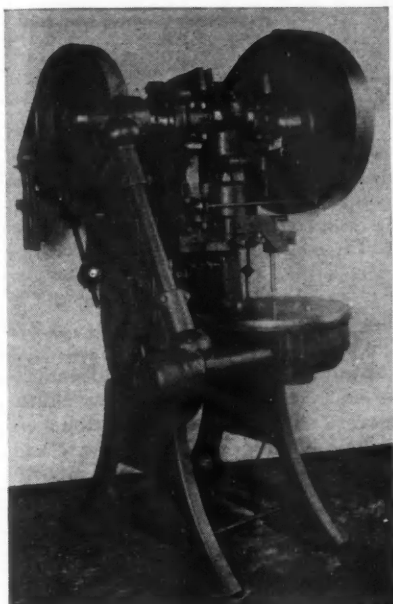


operator. The unique adjustable releasing cam trips the clutch when the nut is tight. It can be furnished for operation in both directions through the use of a reversible switch.

Overall length of the tool is 14½ in.; weight, 16½ lb. net. Capacity ranges from ⅜ to light ½ in. nuts. Electrical specifications—3 phase, 180 cycles, 225 volt.

Dial Feed Has Safety Features

Federal Press Co. Elkhart, Ind., now has on the market a dial feed with many features of safety as well as performance. Every moving part is completely housed while the dial has been designed so that tooling jobs can be interchanged with the ease of changing ordinary die sets. One of the reasons for the ease and speed in changing jobs is the fact that the dial plate is independent of the indexing mechanism, is easily removed, any number of dial plates can be used, and they are low in cost.



Unusual speed is said to be obtained with the Federal dial feed due to smoothness and positive indexing. The indexing mechanism is completely protected from dirt and chips from the pieces being run and accuracy is maintained regardless of what type of work is being run. The dial is skid proof and yet does not employ any brakes, locking pawls or such devices for stopping the dial correctly. It is also possible to index the dial in one fourth of the revolution of the crankshaft allowing longer rest or loading periods between indexes. The dial can be attached to any make of press.

Haynes Stellite Metal Cutting Tools

Haynes Stellite used for machining at high speeds cast iron, malleable iron, semi-steel and certain grades of steel, has been supplemented for same time by an improved grade known as J-Metal Haynes Stellite. Generally speaking, J-Metal Haynes Stellite tools are operated at speeds up to 50 per cent faster than the high speeds at which Grade No. 3 Haynes Stellite is operated, with the same tool life between grinds. Where increased cutting speed is im-

practical, J-Metal Haynes Stellite tools used at the established speed for Grade No. 3 Haynes Stellite tools are giving from two to four times as many pieces per grind.

Haynes Stellite tool bits, milling cutter blades and welded tip tools are standard on a great many machining operations in high-production shops, especially the automotive manufacturing plants.

Automatic Oiling for Machine Tools

The Blanchard Pulsolator, an automatic oil lubrication system for industrial machinery, is the product of the Rivett Lathe and Grinder Corp., Brighton, Mass. While this system has been on the market for some time, it has made great headway recently in its adoption by a number of outstanding machine tool makers whose equipment is largely used in the automotive industry.

The Pulsolator pump is contained in the reservoir and runs in its own bath of oil. It is driven either from a rotating shaft of the unit served or by an individual motor wired to the controller. Thus it starts and stops with the machine. A loop line carries oil to the feeders. The constantly circulating oil stream actuates the indicating lever on the pumping unit. In this manner Pulsolator proves that all is well with the oil supply, or instantly gives warning of trouble in any part of the system. Any feeder may be adjusted to a rate as slow as one drop in ten pulsations or as fast as five drops at one pulsation. As the number of pulsations per minute or per hour is governed by the model of the pump selected and the speed at which it is driven, individual feeds as low as a drop an hour or as high as ten drops a minute can be obtained.

Up to a hundred feeders may be operated from one pump, and these can be arranged in gangs with drip lines to groups of bearings or directly located at bearing points with the loop line leading through them, or on dead-end or branch pipe lines, flexible, if needed, to connect parts of a machine in relative motion with the frame.

Barnes Four-Way Boring Machine

Four-Way Boring Machine recently built by the W. F. and John Barnes Company, Rockford, Ill., for the boring of tractor transmission cases. This machine incorporates a Barnes Duplex "BR" Type Hydraulic Unit which provides an adjustable automatic Feed and Rapid traverse cycle for all four heads. All locating edges and upper surfaces on the bed ways are hardened steel, accurately ground. Quick secure clamping of work pieces is provided by a separate Barnes Hydraulic Unit, which facilitates rapid work handling and increases production.

Production Testing By Magnetic Units

The Ferrous Magnetic Corp., New York, N. Y., has brought out a number of magnetic inspection devices, ruggedly designed for production use, and fully automatic. The first is an automatic magnetic tester for finding defects in steel bars, tubing, etc., taking material up to 2 in. in diameter and running at speeds between 75 and 100 ft. per min.

The second is a wire and strip analyzer operating on the same principle except that the unit is designed for laboratory and research work and consequently is more simple and compact. It comes with interchangeable coils.

The third machine is a magnetic abnormality detector for open hearth and electric furnace steels.

U. S. Hi-Speed Grinder Has Concealed Chuck

Among the products being offered by The United States Electrical Tool Co., Cincinnati, Ohio, are the new "U.S." HI-SPEED grinders.

These tools have rugged die cast aluminum housings; precision ball bearings, enclosed in dust-proof compartments; concealed three-jaw geared chuck of 1/4-in. capacity; quick make and break trigger switch. The motor is designed for high-speed operation to produce the correct surface speed for small wheels.

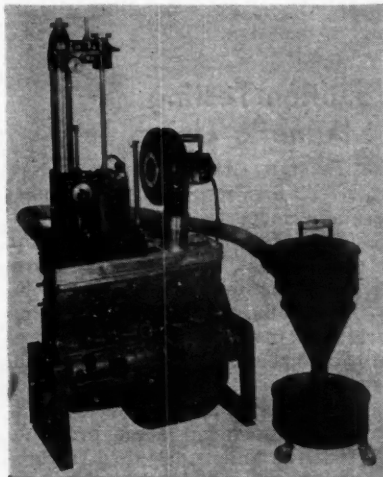
Barnes four-way boring machine



Mirror Finish for Reconditioned Bores

Micromatic Hone Corp., Detroit, Mich., has just announced a new system of cylinder reconditioning embodying many important features, chief of which is the Micromatic mirror finish. The process is patented and many claims are said to be basic in character.

As shown in the illustration, the equipment includes the Hydro-Wrench, a special hydraulic wrench which draws each stud with a uniform tension; a special distortion plate fitted on the



cylinder gasket; the Aline-O-Plate, which is assembled on top of the distortion plate to regenerate alignment; and the Rid-O-Grit attachment for blowing out grit and chips. The latter is provided with a powerful blower which forces a strong current of air down one cylinder and out through a special adapter at the boring head, whence it is carried into the chip arrester.

It is claimed that the use of the distortion head together with the uniform tension of studs compensates for distortion due to head strains and assures perfectly round cylinders. This equipment also includes the Micro-Hone, cutting to the base metal from a bored hole in three minutes and giving the cylinders a mirror finish.

New 3-Ton Elevating Truck

The Baker Industrial Truck Division of the Baker-Raulang Company, Cleveland, has just brought out a new two-wheel drive, four-wheel steer, 3-ton elevating truck which incorporates several new features of design unique in the industry. The most obvious change from previous models is the "streamlined" enclosure for the battery box and controls which not only improves appearance but also increases the safety for the operator.

Standard platforms are furnished in lengths from 55 to 84 inches and can be furnished as special equipment in any length desired. Standard platform height is 11 in., giving ample clearance

under the standard 12 in. skid and the lift is 5½ in. Standard platform width is 26½ in. When the standard truck with the 55 in. platform is carrying a skid 60 in. long by 36 in. wide, a right angle turn can be negotiated in 68 in. intersecting aisles.

Indexing Added to Broaching Machine

Since announcing the new line of Foote-Burt continuous surface broaching machines in *Automotive Industries*, Jan. 27, 1934, The Foote-Burt Co., Cleveland, Ohio, has developed an indexing method which greatly expands the application of surface broaching.

An example of the process is the broaching of square ends on each end of a spring shackle pin as illustrated. The work passes through the first section of the upper and lower broaches, completing two flats on each end. After this cut, the groove on the top plate of the fixture engages the indexing pin giving the work-holding spindle one quarter turn. The work then passes through the remaining section of the broaches, completing the squares. Work is automatically ejected.

Special indexing cycles can be readily worked out so to handle work of any character, as, for example, castellated nuts, gears, etc. In some cases, obviously, the work may have to make several passes through the machine.

Solvent Machine Cleans Faster

The Bower Roller Bearing Co. has recently installed a special Rex solvent machine made by Rex Products & Mfg. Co., for the removal of quenching oil from rollers, races, etc., before the draw back operation.

The cleaning re-agent used with the machine is a chlorinated solvent, known as Perm-A-Clor. This solvent is boiled, evaporated and condensed within the ma-

chine, and the vapors arising from the boiling solvent come in contact with the parts to be cleaned. As the parts enter the machine at room temperature and come in contact with the solvent vapors, the heat exchange between the colder parts and the hot vapors causes condensation of solvent on the surface of the parts. This continues until the work reaches the temperature of the vapors, and thus considerable flow of solvent or rinsing takes place.

The conveyor is of the two strand chain and cross-bar type. Suspended from these conveyor cross bars are wire mesh baskets, which are uniformly spaced throughout the entire conveyor length. The work is then carried about the head shaft of the conveyor, then upward, across and downward into the main housing, and thus into the solvent vapor, which causes the cleaning action, as previously described.

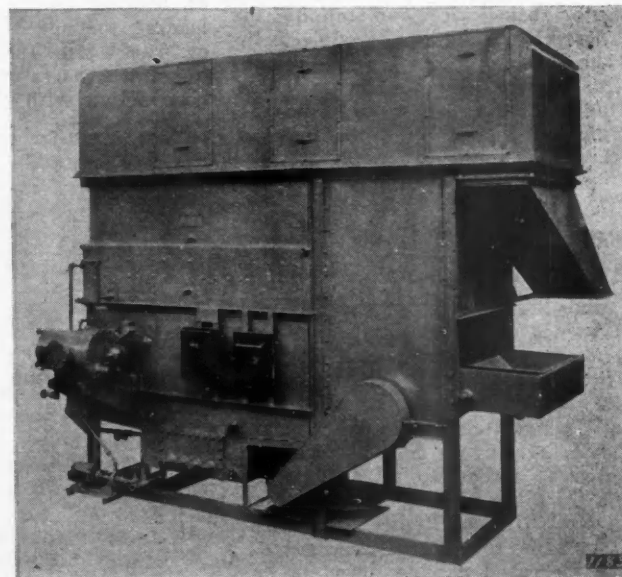
The work is then carried upward and out of the solvent vapor. The surface of the work dries in this vertical travel by evaporation. This dry-off is rapid, being accelerated by the heat in the parts themselves. The conveyor finally returns across the top of the machine to a point above a cross chute over the loading point.

The conveyor baskets are at this point automatically rotated to discharge the cleaned parts into the cross chute. This cross chute is in line with the conveyor belt of the draw back furnace and thus the parts are deposited in properly cleaned condition for the subsequent operation.

Molybdenum Tool Steel Available

MoTung, a new molybdenum-tungsten high-speed steel, is now offered by the Universal Steel Co., Bridgeville, Pa., and Cyclops Steel Co., Titusville, Pa. This material is somewhat easier to handle in machining and heat treatment than the usual 18-4-1 tungsten

Washing machine made by the Rex Products & Mfg. Co.



types. Moreover, the raw material cost is considerably lower.

MoTung steel has the following characteristic composition: Molybdenum, 7.50 to 8.50 per cent; tungsten, 1.25 to 2.00 per cent; chromium, 3.50 to 4.50 per cent; vanadium, 0.90 to 1.50 per cent. The material is available in the usual forms suitable for fabrication.

Among the many applications of the material are: hack saw blades, milling cutters, twist drills, taps, reamers, etc., now available out of stock from a number of tool makers.

Coating Increases Life of Finish

The American Chemical Paint Co., Ambler, Pa., has added a new chemical coating, cromodine, which should be of great interest to factory executives. It is a process for coating cleaned surfaces of steel, with a thin, smooth, tightly adherent coating that is said to greatly increase the adhesion of finishing coats as well as to prolong the life and durability of the metal.

It is interesting to note that the coating alone is not intended to be rust-preventative but when coated improves the life and durability of the finish. The process has been found to work effectively in washing machines of the standard type, provided the machine is lined with stainless steel parts.

The outstanding feature of the process is economy in cost as well as production time. It is possible to coat sheet metal parts in a cycle taking only one minute. And it is claimed by the manufacturer that work can be coated at a cost of only ten cents per 100 sq. ft.

Davis Keyseater With Tilting Table

Davis Keyseater Company, Rochester, N. Y., is now building a keyseating machine with a tilting table so that both straight and tapered keyways can be cut in all kinds of bores. The table is pivoted, near the back end and is provided with an adjusting screw under the front end for raising or lowering it to any angle desired for cutting keyways in tapered bores up to a taper of approximately 3 in. per ft. A scale is provided to indicate the exact taper per foot. The cutter is maintained in a vertical position during all stages of the cutting operation.

Feed is of the table type, operated by hand lever. A stop is provided for stopping the movement of the table

when the desired depth of cut has been reached. Motor drive can be applied easily.

Three sizes of machine are built. The No. 3 machine cuts keyways from 1/16 to 1/2 in.; No. 4 from 1/16 to 1 in. and No. 5 from 1/16 to 1 1/2 in.

Federal Presses With New Clamping Device

Federal Press Co., Elkhart, Ind., after several years of extensive tests, has placed on the market the new improved line of Federal presses equipped standard with Timken roller bearings in the flywheel of all flywheel type presses and Timken roller bearings in the back shaft bearings of all back geared presses.

The presses also have other improvements such as: improved clamping device on the pitman for holding the adjustment of the ram adjusting screw; new style upper knockout brackets amplifying adjustment; also a new method of locking the ball cap in place. The latter feature eliminates the possibility of throwing the cap off center. The nut or cap is threaded type that screws down on the ball end of the ram adjusting screw.

Previous Announcements Briefly Reviewed

Long Stroke Drawing Press

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has met the requirements for deep drawing capacity through the development of a long stroke press of their Hydro-Power Fastraverse class, equipped with synchronized-pressure die cushion.

Industrial Blow Valves

Two industrial blow valves, for installation where stationary control of compressed air is desired, have been announced by A. Schrader's Son, Brooklyn, N. Y. One is intended for use on benches and on light machines. Use of this valve permanently attached to an airline eliminates picking up and laying down movable devices.

The other device is a heavy duty valve, tee-type, intended for power presses, eyelet machines, automatic screw machines, etc.

"Bearing-izer" Finishes Holes

A process developed by the Cogsdill Mfg. Co., Inc., Detroit, Mich., is virtually an internal peening method, making use of a patented device termed a "Bearing-izer." The tool is constructed with a body comprising a number of equally spaced cam surfaces, surrounded by a cage carrying a number of peening rolls. As the tool, or the work, revolves at high speed the rolls are driven outwardly by the cam action producing 20,000 or more blows per minute on the surface of the hole.

Bliss Builds Largest Press

Two interesting power presses were recently built at the Toledo plant of the E. W. Bliss Co. Both are of welded steel plate construction. One is the largest press ever built in this way. Both are of novel design with short shafts running front to back, eliminating torsional strains and connection back thrust against the frame.

Both presses are equipped with Marquette Tool & Mfg. Co. (Toledo) hydro-pneumatic drawing cushions in the beds with automatically timed locking devices.

Hydraulic Control by Foot Valve

Hanna Engineering Works, Chicago, Ill., has introduced a spool-type, foot-operated hydraulic valve, the principal moving part being a spool or piston, fluid balanced in all directions.

The valve is for either three-way or four-way distribution.

Line of Small Electric Brakes

A line of small A.C. and D.C. solenoid-operated brakes is announced by Cutler-Hammer, Inc., Milwaukee, Wis. Three brake sizes are included with torque ratings ranging from 3 lb.-ft. to 75 lb.-ft.

New Automatic Milwaukee Miller

Milwaukee Simplex and Duplex bed type milling machines, first introduced by Kearney & Trecker Corp., Milwaukee, Wis., in 1930, are now provided with complete "two-way" automatic control. With this new feature, the table can be operated automatically or manually, or with a combination of both.

Needle Bushings for Industrial Use

The Torrington Co., Torrington, Conn., has placed on the market a bushing involving the principles of a roller bearing and requiring no more space than the usual babbitt or bronze bushing. It consists of a series of small-diameter rollers with tapered ends, held in a cylindrical steel shell having its ends flanged over inwardly so as to hold the rollers in place.

Built for General Purpose Requirements

Wm. Sellers & Co., Inc., Philadelphia, Pa., has announced the No. 400 horizontal boring, drilling and milling machine for general purpose and manufacturing requirements. Its most important feature is the unit head driven by a 10-hp. constant speed motor.

Conveyor Chains of a New Type

The Whitney Mfg. Co., Hartford, Conn., has brought out a line of roller conveyor chain made in four sizes and in two different types, with standard and oversize rolls.

Description of the Sellers No. 05D Drill Grinder

The No. 05D Drill Grinder, recently announced by Wm. Sellers & Co., Inc., Philadelphia, Pa., is a self-contained grinder of the bench type with built-in motor, push button control, for grinding drills from 1/16 in. to 1/2 in. in diameter.

Pipe and Bolt Threading Machine

A combination pipe and bolt threading machine, the "Little Landis," is announced by the Landis Machine Co., Waynesboro, Pa. It employs the distinctive Landis die head and long-life patented chaser. The machine is of the lathe type, in which the work is revolved. It is designed to thread, ream and cut off pipe and thread bolts, rods, etc.

Fox Three-Ton Broaching Press

A 3-ton broaching press is one of a series of hydraulic forcing and broaching machines being offered by the Fox Machine Co., Jackson, Mich. The frame is of one-piece construction. The 3-ton machine weighs approximately 1900 lb. with the motor.

Barnes Hydraulic Feed Drill Machine

Barnes Drill Co., Rockford, Ill., has placed on the market a heavy-duty hydraulic feed drilling machine, the No. H-3 1/2 Hydram Driller, having a capacity of 3 1/2 in. drilling in S.A.E. 1035 steel.

Production Grinding Without Special Tools

A novel surface grinder, designed to accommodate a large variety of work without elaborate fixturing, is announced by Williams, White & Co., Moline, Ill. It can be used to equal advantage in the production line or in the tool room, for refinishing operations or for grinding rough castings.

Trebled Capacity Loadmaster Crane

A mobile crane of the same construction as Bucyrus-Erie excavators has been announced by Bucyrus-Erie Co., South Milwaukee, Wis.

This crane, designated as CT-50 Loadmaster, (Turn to page 535 please)

JUST AMONG OURSELVES

Financing Profits Look Good to Dealers

THE finance business seems to look rather alluring these days to dealers who have the spare capital to get into it. The return on investment is pretty fair and the risks are minimized by handling only gilt-edge deals, those that are even slightly odorous being turned over to outside finance companies. Played in this manner, it is obviously a rather safe and profitable game. However, there isn't much for finance companies to worry about in the development since there aren't so many dealers who have the necessary capital.

* * *

Beans or Roast Beef For Sunday Dinner

SHOULD employees be paid semi-monthly or every second Friday?

Off hand, the answer probably would be that it doesn't make much difference. And that was the first reaction of the head of a large parts company when his employees through their works council recently asked to be paid every other Friday.

But on checking into the matter, it was found that it did make a difference—the difference between baked beans and roast beef for Sunday dinner.

On the semi-monthly basis, there will be some pay periods during the year which include three Sundays and it was found that when this happened the workers' wives found difficulty in stretching the pay envelope over the third week end.

So now the workers in this particular plant are paid on a bi-weekly basis.

This little incident is just one of many evidences of the growing importance management is attaching to the problem of human relations. There is no doubt that interest in this problem has been stimulated by Section 7A and liberal minded executives are frank to admit that in this respect this controversial section of the Recovery Act has been a good thing—both socially and economically.

* * *

Clean-Ups May Bring Hand-to-Mouth Buying

IT is no secret that there is a widespread belief among dealers at the present time that the clean-up rules they wrote into their code are being used to shift the entire burden of liquidating the tag end of the year's production onto their shoulders. In the past, of course, it has not been uncommon for the factories to share in the loss on this business by rebating dealers on cars in stock, but this has not been the case generally this year.

As a result there is a growing feeling in the trade that dealers who carry adequate stocks through the summer are being penalized. Consequently some dealers now are saying that their new car buying will be on a strictly hand-to-mouth basis next summer. They recognize that inability to make prompt deliveries may cost them some sales. But lacking definite assurances from the factories that they will be protected on clean-up price

cuts authorized in the manner prescribed by the code, they assert that there is no way for them to protect themselves except to hold summer inventories down to the barest minimums.

Of course, whether they will follow through with this threat, remains to be seen. But the fact that they are thinking in these terms emphasizes once again the need for definite rules governing the annual clearance so that discord over this operation will be minimized.

* * *

ECONOMICS has become politics, and politics economics. Today no line can be drawn between the two.—Floyd W. Parsons in *Advertising and Selling*.

* * *

Protection If You Want It

ALTHOUGH intended for police service, if the bandit and kidnapping situation has you jittery, you'll be interested to know that your favorite Plymouth dealer can supply you with a completely armored car. The equipment includes bullet-resisting windshield, side wings, radiator and tire guards, armored dash, cowl, toe- and head-board and armor for both front doors. The cost of the complete assortment will run about \$400, although if you don't want it all, the different items can be bought separately.

Obviously this equipment will put you in a strong position defensively, but if you have a belligerent temperament and want to take the offensive, bullet-resisting gun ports may be had at \$20 each.

Similar equipment is available on Dodge, De Soto and Chrysler cars at a slightly higher total price.—THE EDITORS.

Previous Announcements Briefly Reviewed

(Continued from page 533)

master Crane, is powered with the Caterpillar 50 gasoline or Diesel engine and mounted on modified "Caterpillar" tracks.

Multi-Purpose Hutto Honer

To provide the market with elastic equipment with which to hone bores of varying diameters and lengths, the Hutto Engineering Co., Inc., Detroit, Mich., has added to its line a new machine known as the Model "V-300" series. It is said to provide the required balance of motions with which to hone internal and external diameters straight to extremely close limits.

Cleveland Punch Type Presses

The Cleveland Punch & Shear Works Co., Cleveland, Ohio, has recently added a new line of high-speed, deep throat, punch type presses which feature extra long adjustment to the slide.

Ideal Speed Lathe

The Schauer Machine Co., Cincinnati, Ohio, is supplying its Ideal speed lathe with hand or foot operated collet chuck. The lathe is powered with a totally enclosed ½-hp. two-speed motor.

New Degreasing Process Offered

Magnusol, a new product and process for degreasing metal parts, has been placed on the market by the Magnus Chemical Co., Garwood, N. J. It is intended not only for cleaning in machine shops but also for general maintenance in service stations and garages.

Relief Valve for Industrial Pumps

Tuthill Pump Co., Chicago, Ill., announces the development of a new relief valve for industrial use, now being introduced to the market in six sizes with two pressure ranges.

Niagara Inclined Power Press

The Niagara Machine & Tool Works, Buffalo, N. Y., recently added to its line the A-3½ Inclined Power Press. The frame, a semi-steel casting, has sections proportioned so as to obtain maximum strength and rigidity. The main bearings are tied together by webs and constructed so that the pressure from the crankshaft is transmitted directly to the frame.

For Gaging Small Holes

The Federal Small Hole Gage, Model 166, recently announced by Federal Products Corp., Providence, R. I., is a two-point contact, dial micrometer plug gage for measuring accurately small diameters as well as detecting out-of-round, bell mouth, and taper condition.

Diesinking-Profiling-Engraving Machine

The cavities in forming, stamping, or forging dies as well as raised and sunken letter name plates, for automotive accessories, embossing rolls and work with raised or sunken profiles can be engraved or milled out on the three-dimensional No. H-3 Marquette Universal Diesinking-Profiling Machine, made by the Marquette Machine Co., Toledo, Ohio.

Laminated Profile Gage

The Stockton profile gage, which has been offered to the automotive industry for several years by the Stockton Profile Gauge Corp., Lowell, Mass., has found many varied applications.

The gage is composed of many slotted laminations made of aluminum held in place by a flat metal bar which passes through all the slots.

Tapping Machine with Hopper Feed

The Globe Tapping Machine Co., Bridgeport, Conn., has recently developed an automatic hopper feed machine known as the Globe Type "A." It has a production range from 120 to 180 pieces per minute of single hole parts, either tapped, drilled, countersunk, threaded, hollow milled, etc.

(Turn to next page, please)

Automotive Industries



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A well-planned and properly equipped shop, plus loyal and intelligent mechanics, superintendents and executives, enable us to make good on production promises. Deep-drawn jobs are part of our "run-of-shop" production. If you want a tough job on time, send it to York.

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High-Speed Tapping Machine

R. G. Haskins Co., Chicago, Ill., has developed a high-speed tapping equipment in which a number of improvements are incorporated.

The range of the Haskins No. 2 taper overlaps that of the No. 1—from No. 10 taps up to and including 5/16 in. in steel, 1/4 in. in cast iron, and 7/16 in. in brass and other non-ferrous metals.

Motor Starter Prevents Accidental Starting

A line of automatic motor starters, which prevents accidental starting and permits taking full advantage of the motor's capacity without danger of burning it out, is announced by The Lincoln Electric Co., Cleveland, Ohio. The starter is of the across-the-line type and fully meets underwriters' requirements.

Air Valves for Punch Presses

An interesting air valve attachment for punch presses has been brought out by the F. J. Littell Machine Co., Chicago, Ill. It is said to have an unusually large capacity and blows away comparatively large pieces. It is held in a universal clamp, enabling the operator to adjust the nozzle in any direction.

National Drill Press Vise

The National Machine Tool Co., Racine, Wis., has brought out a handy drill press vise with a number of interesting features.

The vise can be used either horizontally or vertically. Round shafts are firmly and accurately held in place by means of V-grooves.

Hydraulic Feed Surface Grinder

Gallmeyer & Livingston Co., Grand Rapids, Mich., offers its No. 25 hydraulic feed surface grinder with a wide range of table speeds up to 50 f.p.m. The automatic longitudinal and transverse movements are sufficient to enable the operator to cover the entire working surface of table with 1/2-in. wide wheel. The hydraulic mechanism is driven by a 1-hp., 1200-speed motor.

Heavy-Spring Tester of Pendulum Indicating Type

For testing heavy "knee-action" springs the Coats Machine Tool Co., New York, N. Y., is offering a new pendulum indicating Elasticometer, type DN. A screw-operated crosshead, guided within the frame of the machine, bears down on compression springs, compressing them against a lower compression plate.

Improved Automatic Weld Timer

For use with resistance welding machines, the Electric Controller & Mfg. Co., Cleveland, Ohio, announces the Follo 2 EC&M Automatic Weld Timer.

The Landis 5-In. Hydraulic External Race Grinder

The Landis 5-in. hydraulic external race grinder just placed on the market by the Landis Tool Co., Waynesboro, Pa., is a companion machine to the recently announced 3 1/2-in. hydraulic internal race grinder. Like the 3 1/2-in. internal, it has capacity to grind all the smaller sizes up to and including the 218, 316 and 414 groups.

Cellulose-Covered Welding Wire Improves Characteristics of Weld Metal

WHEN welding is done with bare wire electrodes, the metal melts and solidifies while directly exposed to the air. This condition is favorable to the absorption of oxygen and nitrogen, and is aggravated by the action of the arc in ionizing these gases, or in converting them from their normal molecular state to the atomic state. To protect the metal from the gases of the atmosphere while in the molten state, coated welding rod is now much used. One particular kind has a coating of cellulose, the coating being so constituted that pyrolytic decomposition of the cellulose produces a powerful reducing gas at the arc, whose principal constituents are hydrogen and carbon monoxide.

Studies of the weld metal obtained with bare welding rod and with the cellulose-coated type have been made by Samuel L. Hoyt, director of metal-

lurgical research of the A. O. Smith Co., and formed the basis of a paper read at the meeting of the American Society for Metals. Following are typical compositions of weld metals from bare welding wire and cellulose-coated wire:

	Bare	Cellulose-Coated
Carbon	0.05 and less	0.08
Manganese . .	0.10 and less	0.50
Silicon	0.01	0.20
Phosphorus . .	0.02	0.015
Sulfur	0.03	0.025
Oxygen	0.20 and more	0.06
Nitrogen . . .	0.15	0.01

Following is a comparison of the physical properties of the weld deposited from the bare rod and the cellulose-coated rod respectively. The metal deposited from the cellulose-covered rod was reheated to 1200-deg. F. before the tests were made:

	Bare Rod	Cellulose-covered rod
Yield point	35,000-40,000	40,000-45,000
Tensile strength	50,000-60,000	55,000-60,000
Elongation (2 in.) . . .	6-12 per cent	30-40 per cent
Reduction of area . . .	8-20 per cent	45-55 per cent
Charpy value		30-40 ft.-lb.
Endurance limit		30,000 lb. per sq. in
Brinell hardness No. . .	100-110	120